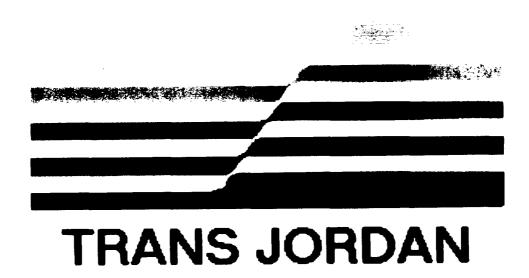


PERMIT RENEWAL APPLICATION

TRANS-JORDAN LANDFILL



March 31, 2004
Revised April 22, 2005

Common of Call

APPLICATION TO RENEW A PERMIT TO OPERATE A CLASS I LANDFILL

Trans-Jordan Landfill

March 31, 2004

PART I - GENERAL INFORMATION



Trans-Jordan Cities 10873 S. 7200 West P.O. Box 95610 South Jordan, Utah 84095-0610 Tel: (801) 569-8994

Fax: (801) 352-0578 E-mail: landfill@qwest.net

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Rule R315-301 through R315-320

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INTRODUCTION

This document presents an application to renew a permit to operate solid waste disposal facilities at the Trans-Jordan Landfill (TJL), which is owned and operated by Trans-Jordan Cities (TJC). The TJL is currently operated under permit number 9421 issued by the Utah Solid and Hazardous Waste Control Board. This permit became effective on April 1, 1998 and expired at midnight on March 31, 2003. The submittal of an updated permit application has been delayed due to TJL entering the Corrective Action Program for ground water monitoring as detailed in section R315-308 of the Solid Waste Permitting and Management Rules. The inclusion of the approved Modified Corrective Action Plan in the permit renewal application was necessary in accurately representing the current operations at TJL.

This permit application contains conceptual level engineering sufficient for permitting purposes only. Detailed engineering documents (construction drawings, specifications, and QA/QC plan) for each of the specific construction tasks will be finalized and submitted to the Division of Solid and Hazardous Waste (DSHW) for approval prior to actual construction. This permit application does not represent a lateral expansion to the currently permitted landfill cells. It does, however, contain several changes in engineering and operational issues at the landfill. These changes include:

<u>Corrective Action</u> – the most notable change that has occurred since the last permit renewal is TJL entering the ground water Corrective Action Program. The ground water corrective action is the result of the ground water at TJL statistically exceeding the ground water protection standard for Tetrachloroethene. All Corrective Action related documents are included in this permit renewal as Appendix C – Modified Corrective Action Plan. The Corrective Action Plan; derived as a response for the Corrective Action Program lists three specific corrective measures to be implemented at TJL The corrective measures are as follows:

Corrective Action #1 – Accelerated Closure of Unlined Landfill

TJL has accelerated the closure of the unlined landfill. The first step in the closure of the unlined landfill is the closure of the north side slopes. The final cover (5' minimum soil cover) has been placed on a large portion of the north side slopes.

The next Phases of the landfill closure are identified as Phases A through H. In an effort to minimize the impact to ground water; TJL has revised the methodology in which it

will close the landfill. The new closure Phases reflect an accelerated schedule in the construction of final cover over the unlined landfill.

Corrective Action #2 – Installation of a Gas Collection System

As part of the New Source Review program of the State of Utah Division of Air Quality, TJL had a methane collection system designed and ready for installation as the landfill was closed sequentially. Due to the Corrective Action Plan; the landfill gas collection system design is being revised to reflect the accelerated closure Phases.

In addition to the design considerations for accelerated closure; the landfill gas collection system design will make allowances for a landfill gas-to-energy project. TJC has initiated a partnering arrangement to beneficially use the landfill gas produced at the TJL. Construction of the landfill gas-to-energy project will commence once Phase A of closure is complete. The construction of Phase A is anticipated to be completed late 2004.

Corrective Action #3 – KUC (Kennecott Utah Copper) Ground Water Recovery System

The third and final portion of the proposed Corrective Action Plan is a ground water recovery system being implemented by KUC. The implementation of this ground water recovery system along with other modifications to the ground water recharge regime have rendered the TJL ground water monitoring program obsolete. The TJL ground water monitoring program will be modified as required by the Modified Corrective Action Plan.

Configuration of Cells 3, 4, 5, & 6 – the configuration of the excavated surface within Cells 3, 4, 5, and 6 of the lined landfill cells have been modified to enhance the collection of landfill leachate. This change results in a slightly increased design capacity of the landfill, but does not represent a lateral expansion of the previously permitted lined landfill cells as the changes are all within the original permitted area.

<u>Final Cover Configuration</u> – the new configuration of the final cover represents a slight modification to the final cover contours. The changes in the final cover geometry reflect modifications to the storm water management plan, modifications to the final cover made to accommodate the gas collection system, and allowances for long-term settlement.

<u>Plan of Operation</u> – the Plan of Operation has been updated to reflect current operation practices.

This application has been organized to follow the general outline of R315-302 and R315-320. This organization results in some duplication and repetition of information, but it is intended to simplify the review and approval of the permit renewal application. Part I of this document duplicates the standard form outlining general data pertaining to the site. Part II is a general report that includes a facility description, landfill operations plan, and Closure and Post-Closure care plans. Part III is the Technical & Engineering Report and includes details on the design and geohydrology of the site.

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I. Landfill	ation Type	New Application⊠ Renewal Application	Facility Expansion Modification				
For Renewal Applications, Facility Expansion Applications a			9421				
M. Facility Name and Location.							
Legal Name of Facility Trans-Jordan Landfill							
Site Address (street or directions to site) 10873 S. 7200 West			County Salt Lake				
city South Jordan	State UT	Zip Code 84095	Telephone (801) 569-8994				
Township 3S Range 2W Section(s) 15	,	Quarter/Quarter Section	Quarter Section				
Main Gate Latitude degrees 40 minutes 33	seconds 37	Longitude degrees 11	2 minutes 3 seconds 42				
N. Facility Owner(s) Information							
Legal Name of Facility Owner Trans-Jordan Cities							
Address (mailing) P.O. Box 95610							
City South Jordan	State UT	Zip Code 84095-0610	Telephone (801) 569-8994				
V. Facility Operator(s) Information							
Legal Name of Facility Operator Trans-Jordan Cities							
Address (mailing)							
P.O. Box 95610	Aut. LIT	Zip Code 84095-0610	Telephone (801) 569-8994				
City South Jordan	State UT	Zip Code 84095-0610					
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Trans-Jordan Cities							
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City South Jordan	State UT	Zip Code 84095-0610	Telephone (801) 569-8994				
W. Contact (riomation			表 また、また。 この こう				
Owner Contact Mr. Dwayne J Woolley		Title General Manager					
Address (mailing) P.O. Box 95610							
City South Jordan	State UT	Zip Code 84095-0610	Telephone (801) 569-8994				
Email Address gm-landfill@qwest.net		Alternative Telephone (cell or	other) (801) 244-0477				
Operator Contact Mr. Dwayne J Woolley		Title General Manager	Title General Manager				
Address (mailing) P.O. Box 95610							
city South Jordan	State UT	Zip Code 84095-0610	Telephone (801) 569-8994				
Email Address gm-landfill@qwest.net		Alternative Telephone (cell or	other) (801) 244-0477				
Property Owner Contact Mr. Dwayne J Woolle	Property Owner Contact Mr. Dwayne J Woolley Title General Manager						
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City South Jordan	State U	T Zip Code 84095-0610	Telephone (801) 569-8994				
Email Address gm-landfill@qwest.net		Alternative Telephone (cell	or other) (801) 244-0477				

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Dwayne J. Woolley Name typed or printed						P.O. Box 95610 South Jordan, UT			
	nd Own	ner Representative (if ap	plicable)			P.O. Box 95610		·	
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APPLICATION TO RENEW A PERMIT TO SOLID & HAZARDOUS WASTE OPERATE A CLASS I LANDFILL

Trans-Jordan Landfill

March 31, 2004 (Revised April 20, 2005)

PART II - GENERAL REPORT

Trans-Jordan Cities 10873 S. 7200 West PO Box 95610 South Jordan, Utah 84095-0610 Tel: (801) 569-8994 Fax: (801) 352-0578

E-mail: landfill@transjordan.org

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SECTION 1 - FACILITY DESCRIPTION

The Trans Jordan Landfill (TJL) began operation in 1958 and is a cooperatively operated solid waste landfill operated by Trans-Jordan Cities (TJC). TJC was officially formed in 1986 to dispose of the solid wastes generated in the southern half of Salt Lake County as a political subdivision of the State of Utah. The landfill had previously operated as Tri-Cities landfill. TJC is a political subdivision of the State of Utah and operates under an Interlocal Agreement between its' member cities (the Cities of Draper, Midvale, Murray, Riverton, Sandy, South Jordan and West Jordan) with a combined population of 307,000 (2000 census). Operation of TJL is administered by a board with representatives from each member city. Management of the landfill is coordinated by Mr. Dwayne J. Woolley, General Manager.

TJL in conjunction with South Valley Water Reclamation Facility (SVWRF) cooperatively fund the operation and maintenance of a wood products and green waste grinding facility in operation since 1996. SVWRF is the operator of this facility located immediately south and adjacent to the landfill.

Significant facility upgrades were initiated in 1997 with the construction of a new scalehouse, scales, operation and maintenance building, waterlines, watertank, and installation of fire suppression pumps. The water tank and associated pumps provide fire protection for both the TJL facilities and the green waste facility.

During 1999, TJL constructed and placed on-line, a citizen drop-off facility (Public Convenience Center or PCC) at the landfill. The PCC provides a safe and clean area for the general public to properly dispose of Household Hazardous Waste (HHW), recyclables and municipal solid waste. The HHW portion of the PCC facility is a joint operation with Salt Lake Valley Health Department (SLVHD).

In 2003 TJL constructed and placed on-line a radiation detection system. This facility; installed on the inbound scales is intended to minimize the likelihood of regulated radioactive wastes being disposed of in the landfill.

The TJL facilities are located on land owned by TJC at 10873 South 7200 West, in Section 15 of Township 3 South, Range 2 West. Drawing 1 (Title Sheet/Area Maps) shows the location of TJL. Appendix A – Drawings include all of the permit renewal drawings.

Access to TJL is provided from U-111 (old State Route 111) with the facility entrance at the

landfill's northwest corner. TJL is located within the city of South Jordan, with West Jordan city limits approximately 1 mile northeast. The community of Herriman lies approximately 3 miles south-southeast and Copperton is 1.5 miles to the west. With the exception of construction trailers, there are no homes or industrial buildings within one (1) mile of the landfill.

The TJL has power lines located inside the north boundary of the landfill running across the north side slopes of the unlined landfill and an abandoned railroad right-of-way along the north and west sides of the property. All other areas of the landfill utilized for solid waste disposal are free of any utility right-of-way restrictions.

Information pertaining to site access, operations, and facility contact information is presented on a sign at the entrance to the landfill.

1.1 AREA SERVED

In addition to waste from the member cities, waste from other municipalities and unincorporated areas of Salt Lake County are disposed of at TJL.

1.2 WASTE TYPES

The waste disposed of at the landfill is solid non-hazardous municipal waste, inert construction debris and landscaping debris with some solid demolition and non-hazardous operations waste from Kennecott Utah Copper (KUC) mining and milling operations. Non-acceptable materials include liquid wastes of any kind, burning materials, radioactive wastes and hazardous wastes. Any vehicle hauling non-acceptable wastes to TJL is refused entrance to the landfill. The appropriate State or County agency is then notified. PCBs will be of particular concern and will be specifically called out as not being allowed to enter the landfill; appropriate legal action can be initiated if attempts are made to dispose of these materials. Tires, batteries, oil, antifreeze, solvents and other household liquids are accepted at our HHW facility and disposed offsite by SLVHD. Hazardous wastes are not accepted for disposal at TJL.

1.2.1 Unlined Landfill

The unlined landfill cell (as indicated on Drawing 2 – (General Arrangement)) has served parts of Salt Lake County since the mid 1950's. The exact date of first waste acceptance is not clear; data suggests that it is circa 1958. Based on an early topographic survey and the current topography of the site, the estimated volume of waste and soil disposed of in the unlined landfill cell is just over 7.5 million cubic yards.

No records exist that determine the nature and extent of the wastes accepted at the landfill prior

to the formation of TJC in 1986. Therefore, the composition of the wastes disposed of in the unlined landfill is unknown; it is assumed to consist of a combination of residential, agricultural, commercial, and industrial wastes.

Since TJC was formed, the landfill has accepted a variety of non-hazardous wastes from residential, commercial, and industrial sources located within TJC's service boundaries and from neighboring communities. There are no records that indicate TJL has ever knowingly accepted asbestos containing materials. Drawing 2 (General Arrangement) shows the location of the unlined landfill with respect to site structures. Drawing 3 (Sections - Existing) shows the section views of both the lined and unlined landfill. Drawing 4 (Lined/Unlined Landfill Cells) shows the extent of the unlined landfill with regards to the six lined Cells.

1.2.2 Lined Landfill Cell

The landfill currently accepts approximately 1,000 tons per day of municipal solid waste. This waste consists primarily of: commercial front and side loaders and roll-off containers; and wastes that are self-hauled to the landfill by both private citizens and commercial entities. The quantities of solid wastes accepted at TJL vary seasonally.

1.3 HOURS OF SITE OPERATION

TJL is open to the general public and commercial haulers for solid waste disposal Monday through Saturday from 7:00 a.m. to 6:00 p.m., year-round, excluding holidays (New Years, July 4, Thanksgiving Day, and Christmas Day). TJL controls public access to the landfill to prevent illegal dumping of wastes, public exposure to hazards, scavenging, and unauthorized traffic. Access control is a key element in preventing unauthorized scavenging or potential injury. Fences, locked gates, video surveillance, and natural barriers provide the basis of the site's access control system. During operating hours, TJL personnel monitor and control all access to facilities with at least four (4) people on-site (Operation Supervisor, Equipment Operator, Scale House Operator, and Spotter), one of which is always in the scale house and one at the active face.

1.4 LANDFILL EQUIPMENT

The following equipment is currently utilized at TJL:

- Two (2) diesel generators, 30 hp (light tower)
- Three (3) diesel compactors
- One (1) diesel engine, 5 hp (water pump)
- Three (3) diesel bulldozers

- One (1) smooth drum compactor
- One (1) diesel IT (Integrated Tool Carrier)
- Three (3) diesel scrapers
- One (1) diesel grader
- Three (3) diesel trucks (roll off and water)
- One (1) 45 kV diesel backup generator
- Miscellaneous gasoline lightweight vehicles for transportation

The trash compactors are used to spread and compact solid waste disposed of at the landfill and for the placement of daily cover soils. The smooth drum compactor and grader are used for road and embankment construction and all other dirtwork requiring grading and compaction. The bulldozers are used to provide backup waste placement duties, loading the scrapers and for general site work. Scrapers are used to excavate and haul daily and final cover materials as well as excavate material within proposed landfill expansion areas. The water truck is used for dust control and recycle/disposal of leachate as required. The equipment on site is sufficient for current operations and may be changed at any time to meet changing requirements of the landfill.

1.5 PERSONNEL

The following persons are responsible and/or available for on-site landfill operations at TJL:

- <u>General Manager</u> The General Manager is responsible for all landfill operations including planning, engineering, and site operations. He reports to the Board of TJC. He is supported by both an administrative assistant responsible for human resources, purchasing and general administrative duties and the following personnel:
- <u>Controller</u> The Controller is responsible for all scalehouse operations and financial and computer functions at the facility. The Scalehouse Supervisor and Scalehouse Operator(s) report to the Controller who reports to the General Manager.
- <u>Compliance Coordinator</u> The Compliance Coordinator is responsible for ensuring that the landfill is in compliance with all rules and regulations regarding the safe operation of the landfill including: permits, personnel training, safety, surveying, and OSHA requirements. The Compliance Coordinator reports to the General Manger.
- Operations Manager The Operations Manager is responsible for all site operations at the Landfill Facility and is assisted by two Operations Supervisor(s). The Operations Manager directs the daily waste placement, equipment operations, and all other activities

- related to landfilling operations. The Operations Manager or one of the Operations Supervisors is on duty during all hours of landfill operation. The Operations Manager reports to the General Manager.
- Operation Supervisor(s) The Operation Supervisor is responsible for all operations relating to the surface operation of the landfill. The Equipment Operators, Mechanic, Spotters, and HHW personnel report to the Operation Supervisor. The Operation Supervisor reports to the Operation Manager.
- Equipment Operator(s) The Equipment Operators are responsible for daily operations at the working face of the landfill. There are typically four (4), and no less than two (2), Equipment Operators on duty at the landfill at any given time. All Equipment Operators report to the Operation Supervisor.
- <u>Truck Driver(s)</u> The Truck Drivers are responsible for daily movement of waste bins from the PCC to the working face of the landfill, water truck operations, and transporting of recyclables offsite. There are typically two (2), and no less than one (1), Truck Drivers on duty at the landfill at any given time. All Truck Drivers report to the Operation Supervisor.
- Mechanic (Mechanic Helper) The Mechanic (Mechanic Helper) is responsible for routine maintenance of heavy equipment, landfill vehicles and auxiliary equipment located at the landfill. The Mechanic is on duty 8 hours per day Monday through Saturday. The Mechanic (Mechanic Helper) reports to the Operation Manager.
- Spotter(s) The Spotters are responsible for inspecting incoming loads to prohibit hazardous and other unacceptable materials from being unloaded at TJL. Spotters are also responsible for directing traffic, ensuring public safety and properly diverting recyclable materials to the proper location. The Spotters are trained in the identification of various solid wastes and report to the Operations Supervisor. There are typically four (4) Spotters on duty at any given time.
- <u>HHW Technician/Spotter(s)</u> The HHW Technicians/Spotters are responsible for accepting and screening incoming HHW loads and bulking those materials. The HHW personnel are specially trained to handle HHW and report to the Operations Supervisor. The SLVHD oversees the operation of all HHW facilities in the County.
- <u>Scale House Supervisor</u> The Scale House Supervisor is responsible for the overall operations of the scale house. The Scale House Supervisor reports to the Controller.

• <u>Scale House Operator(s)</u> – The Scale House Operators are responsible for screening incoming loads and collecting tipping fees at the scalehouse. The Scale House Operators report directly to the Scalehouse Supervisor.

Temporary employees or contractors will report directly to the Operations Manager, or his designee. These may include litter control, labor, operators, spotters, surveyors, and inspectors.

SECTION 2 - LEGAL DESCRIPTION & PROPERTY OWNERSHIP

TJC was formed in 1986 by interlocal agreement which designated TJC as responsible for managing the solid wastes generated by the member cities. The landfill originally consisted of approximately 4.95 acres of TJC owned land and approximately 90 acres of leased Kennecott Utah Copper (KUC) land. Additional land was purchased from KUC in 1993 and 1997. Two small property boundary realignments were done in 1999 between KUC and TJC properties to better define the actual landfill boundaries. TJC leased additional KUC property in 2001 as a buffer to the east and south of the landfill.

A copy of the legal description and proof of ownership is included in Appendix B – Legal Description & Property Ownership. The location of TJL is as indicated on Drawing 2 (General Arrangement). TJC has the exclusive right to operate a landfill on the property.

SECTION 3 – OPERATION PLAN

On October 9, 1991, the U.S. Environmental Protection Agency (EPA) announced revisions to the Criteria for Classification of Solid Waste Disposal Facilities. These revisions were developed in response to Subtitle D of the 1984 Hazardous Waste Amendments to the Resource Conservation and Recovery Act (RCRA). The Subtitle D regulations set forth revised minimum federal criteria for municipal solid waste landfills (MSWLFs), including facility design and operating criteria. The Subtitle D regulations set forth differing requirements for existing and new units (e.g., existing units are not required to remove wastes in order to install liners).

Subtitle D established a framework for federal, state, and local government cooperation in controlling the management of non-hazardous solid waste. The federal role in this arrangement is to establish the regulatory direction by providing minimum nationwide standards for protection of human health and the environment and by providing technical assistance to States for planning and developing their own environmentally sound waste management practices. However, the actual planning, direct implementation, and enforcement of solid waste programs under Subtitle D remains largely a state and local function.

On November 5, 1995, the State of Utah Department of Environmental Quality (UDEQ) issued final Administrative Rules entitled Solid Waste Permitting and Management Rules (R315-301 through 320) implementing Subtitle D at the state level. UDEQ has received authorization from EPA to implement and enforce the solid waste program.

TJC has prepared this Operation Plan to guide the daily operations at TJL. This document provides substantial discussion of operations at the landfill based on the operating criteria outlined in 40 CFR 258, Subpart C, and State of Utah Administrative Rules R315-301 through 320.

Portions of this Operation Plan are subdivided into separate discussions of the unlined landfill and the lined landfill. Since the unlined landfill accepted waste after October 9, 1993, its closure and post-closure care must follow more stringent state and federal regulations than those facilities which were closed prior to October 9, 1993.

3.1 SCHEDULE OF CONSTRUCTION

Future construction of the lined landfill cells will be made according to the methodology presented in the drawings (Appendix A – Drawings). These drawings show the conceptual configuration of the completed landfill and details for selected key elements of future landfill development. The

proposed configuration was developed based on geologic/hydrogeologic conditions, geotechnical considerations, environmental assessment data, and operational considerations.

TJL has adopted the following definitions for clarification of the overall development cycle of the landfill:

- <u>Cells</u> Cells represent the incremental excavation and associated liner construction at the base of the landfill. The lined landfill has been divided into six (6) distinct Cells. The Cells are numbered 1 through 6 and are oriented from west to east.
- <u>Phases</u> Phases represent the incremental filling and associated final cover construction on the landfill. TJL has been divided into (8) distinct Phases. The Phases are lettered A through H.

Drawings, specifications, and QA/QC Plans for Cells 1, 2, and 3 have been previously submitted to Utah State DEQ -Division of Solid and Hazardous Waste (DSHW) for review and approval prior to construction. Cells 1, 2, and 3 have been constructed and have received waste. Each additional landfill Cell will be designed and constructed when the previous operational phase is nearing its intermediate capacity. Detailed drawings, specifications, and QA/QC plans will be developed for each additional Cell construction and submitted to the DSHW for review and approval prior to construction.

Drawings 5 and 6 (Future Landfill Development) illustrate the general sequencing of the remaining lined landfill Cells and closure Phases at TJL. The sequencing drawings show both the excavation of the remaining Cells as well as the placement of waste to final cover contours. Cell 4 is currently scheduled for liner installation during the year 2007. The construction of Cells 5 and 6 will be completed as required to meet the disposal needs of TJL and are anticipated to occur between 2012 and 2016.

The remaining capacity of Cells 1, 2, and 3 plus the future Cells (4, 5, and 6) have airspace for approximately 25 years of disposal, based on available fill volume, expected daily waste disposal rates, and an in-place density of 1,300 pounds per cubic yard (ppcy) of waste.

Surplus soil excavated from the development of each additional Cell of the lined landfill area will be used for daily, intermediate, and final cover or strategically stockpiled. At a minimum; enough soil will be stockpiled to construct the final cover for Phases G and H.

As a general rule for the construction of future landfill Cells; the next lined landfill Cell should be planned for availability no less than 24 months prior to the completion of filling in the operational disposal area.

3.2 DESCRIPTION OF HANDLING PROCEDURES

3.2.1 General

All waste entering the landfill is weighed and then monitored continually from the scale to the working face, PCC, or green waste facility by landfill personnel. Usually two and sometimes three individuals will monitor the waste being off-loaded at the working face. Illicit material will be turned away and documented as such (to the SLVHD). Waste delivered to the PCC is continually monitored by Spotters to exclude hazardous waste and separate recyclable and HHW materials.

After a vehicle leaves the scalehouse, the vehicle will be routed to the appropriate discharge location. Loads will be regularly surveyed at the tipping area by spotters. The waste materials will be placed and compacted in two-foot lifts to provide the waste compaction necessary to meet the design landfill capacity. The materials will be placed at the toe of the operational face and spread up slope with a landfill compactor to provide relatively uniform sloping (maximum 3H:1V slopes) lifts.

The daily module will consist of a series of 2-foot lifts placed to a height of approximately 8 to 10 feet. At the maximum height of 10 feet of waste material, the daily module will be covered with 6" of daily cover soil. Section 3.10 discusses in detail the inspections of waste loads.

Waste delivered to the PCC is placed into rolloff containers by an operator using the Integrated Tool Carrier (IT). Once the rolloff containers are full, a hook truck delivers the rolloff containers to the working face for disposal. Recyclables and green waste delivered to the PCC are placed into designated rolloff containers and routed to the appropriate facility.

3.2.2 Sequence of Development

The unlined landfill Cell is historic in nature and was consequently constructed without a liner or leachate collection system. Final cover has been placed on the north slopes of the unlined landfill cell as shown on Drawing 9 (Details) the typical section of the north side slope cover. Waste has been added over the unlined landfill Cell historical footprint to bring the elevation of the landfill to the final cover design slopes.

The following paragraphs describe the filling sequence for the remaining Phases of the TJL. This sequencing will result in the planned placement of wastes to maximize the stability of the fill at any time during operation of the landfill. The Operators will not deviate substantially from the sequencing plan without concurrence of the Operations Manager.

The lined landfill has been designed to be constructed in six (6) Cells as shown on the Drawing 4 (Lined/Unlined Landfill). The constructed base of each lined landfill Cell is sloped toward the leachate collection/evaporation pond (LCEP). The LCEP moves with the construction of each Cell of the lined landfill; always being located at the most downgradient point of the lined landfill. Future landfill development will include leachate collection pipes (LCP) located at various spacing along the south side of each Cell to assist with the transport of leachate to the active LCEP. Leachate is held in the LCEP until evaporated. In the event of a period of prolonged above normal precipitation; leachate will be pumped from the collection/evaporation pond and recirculated over the lined landfill to keep the head on the liner less than the required 12" and to maintain the 12" minimum freeboard in the LCEP. The leachate collection/evaporation pond is permanently marked to show the depth of leachate at any given time and to indicate remaining freeboard within the collection/evaporation pond.

3.2.2.1 Protective Soil Layer/Select Municipal Solid Waste (MSW) Placement

After the completion of the liner system installation for each Cell; a one (1) foot thick layer of screened protective soil is placed over the liner components. The screened soil placement extends over the liner installed across the bottom of the Cell to help protect the liner from damage. A second one (1) foot layer of bank run material is then placed over the screened material to complete a two (2) foot protective layer in the base of the lined Cell. Drawing 9 (Details) illustrates the configuration of the bottom liner and the protective soils. The first solid waste placed in a newly constructed Cell will be placed in a layer approximately 6 feet thick using only select MSW (side loader only). Objects capable of damaging the liner (i.e.: rebar, pipe, or other similar objects) will be removed from the deposited waste and the solid waste will be compacted as a single lift, with no intermediate compaction to provide a six (6) foot thick protective working surface over the protective soils.

Since the application of select waste over the one (1) foot thick layer of protective soil on the side slopes will take place incrementally as the level of MSW within the Cell raises, specific measures will need to be followed to minimize the potential of liner damage. The following procedure will be followed to ensure protection of the liner over the side slopes:

All spotters and equipment operators involved with the placement of select MSW will have annual training delineating the screening and placement of the select MSW. The annual training documentation will identify the person receiving the training, date of training, and the name of the person providing the training. All training documents will be included in the operation record.

As the waste is placed, landfill equipment will spread the MSW in a layer approximately 3-4 feet thick. The equipment operator will perform the initial screening of the MSW as he/she spreads the MSW. A dedicated spotter will perform the second screening of the MSW for objects capable of causing damage to the liner (i.e.: rebar, pipe, or other similar objects). All materials with the potential of damaging the liner through the one (1) foot thick soil layer will be removed from the MSW.

The Operations Supervisor will periodically observe the placement of the select MSW layer on the side slopes as a final screening of the select MSW. Drawing 9 (Details) illustrates the configuration of the Cell liner over the side slopes.

3.2.2.2 Development of Cells 1, 2, and 3

Construction

Cell 1 construction started the summer of 1997; stopped due to winter weather, and was completed June of 1998. Excavation of Cells 2 and 3 was performed in conjunction with the placement of daily and intermediate cover in the unlined landfill and Cell 1. Additionally; various landscape and soil stockpile berms were constructed with soils from the Cell 2 and Cell 3 excavation. Liner construction of Cell 2 and 3 was started prior to the complete filling of the Cell 1 area with Cell 2 construction being completed October of 2000 and Cell 3 being completed in the fall of 2002 respectfully.

Waste Placement

Cell 1 was filled beginning at the north and working towards the south where possible. Waste was and is being placed in 8 to 10 foot thick lifts depending upon the volume of waste being handled at the facility. Each lift was completed across the entire area of Cell 1 and terminated at the east edge slope for Cell 2.

Cell 2 waste placement began along the western side; where Cell 2 adjoined Cell 1. The landfill operation proceeded in a general west to east fashion with each successive lift being tied into Cell 1. Cell 3 operations proceeded in a similar fashion to Cell 2 with the MSW being tied into waste previously placed as part of filling Cell 2.

At no time shall waste be placed within the landfill Cells at slopes exceeding 3H:1V. As the operations within each Cell extend in elevation above the existing topography; each lift will extend toward the south slope, where they will coincide with the final cover elevations. Final cover slopes will not exceed 4H:1V as shown on Drawing 7 (Final Cover).

3.2.2.3 Development of Cells 4, 5 and 6

Construction

Excavation for daily, intermediate and final cover is being conducted in Cell 4. Currently; TJL is concentrating on bringing the northwest area of the unlined landfill to final grade to accommodate final cover construction of Phase A. The construction of Cell 4 will be far enough in advance to ensure that Cell 4 is fully operational prior to the completion of Phase D. Drawing 5 (Future Landfill Development) shows the geometry and location of Phase D filling and Cell 4 excavation. Cell 4 is currently scheduled for construction during the year 2007.

The excavation of Cells 5 and 6 will follow once Cell 4 is excavated to final grade. Soil generated from the excavation of Cells 5 and 6 will be used for daily and intermediate cover and also stockpiled in a temporary soil stockpile located outside the perimeter of the main landfill. The stockpiled soil will be used for final cover. The construction of Cells 5 and 6 is scheduled for 2012 and 2016 respectively.

Cells 4, 5 and 6 will be constructed in accordance with detailed construction drawings, specifications, and QA/QC plan which will be developed for each cell and submitted to the DSHW for review and approval before construction begins.

Waste Placement

Cell 4 will be filled in the same general manner as Cells 1, 2, and 3. Filling will tie into waste already placed in Phase D. In general, each lift will be placed substantially across the bottom of the entire Cell 4 area before the next lift is started.

At no time shall waste be placed within the landfill cell at a slope exceeding 3H:1V. Each lift extends toward the south slope, where they coincide with the final cover elevations. Final cover slopes will not exceed 4H:1V as shown on Drawing 7 (Final Cover).

3.2.3 Infectious Wastes

TJL will occasionally accept infectious waste. The following procedures will be in effect to minimize the potential human contact with the infectious waste:

- Upon entering the landfill, the transporter of infectious waste shall notify the scalehouse operator that the load contains infectious waste.
- The infectious waste containers will be placed at the bottom of the working face with sufficient care to avoid breaking them.
- The infectious waste will be immediately and completely covered with a minimum of 12 inches of soil or MSW that contains no infectious waste.
- The infectious waste will not be compacted until the 12 inches of soil or MSW containing no infectious waste is in place.

TJL will maintain on file an Infectious Waste Management Plan as required by Section R315-316 of the Rules.

3.2.4 Special Wastes

3.2.4.1 Used Oil and Batteries

TJL is a "Used Oil Recycle Center". When a customer has used oil to dispose of they fill out the form "UTAH DIYer USED OIL LOG" provided by UDEQ. A report generated from this form is turned in quarterly stating the amount of oil deposited and the customer's names. Waste oil is bulked and shipped to an oil reclamation facility. Batteries are not accepted at the working face. TJL provides a pallet in the PCC area where incoming batteries are stored until a sufficient number is generated to facilitate delivery to a recycler.

3.2.4.2 Bulky Wastes

White goods are accepted at the landfill and are separated for recycling. All appliances containing refrigerants are segregated in a separate area. Refrigerant is removed and the appliances are loaded into the metal bin for recycling. Used cars are not accepted at TJL. Persons seeking to dispose of used car bodies are directed to take the car to a metal recycler.

3.2.4.3 Tires

TJL accepts small quantities of tires from the general public. Commercial haulers are prohibited from disposing of tires at TJL. Up to four passenger tires are accepted from the public with each load. A base fee is assessed for all passenger car tires with a surcharge for tires larger than a typical passenger size (16" rim). All tires are stored in a designated tire storage area. When sufficient quantities of tires are collected, a tire hauler is called and the tires are removed from the facility for recycling.

3.2.4.4 Dead Animals

Dead animals are not routinely accepted at the landfill. When dead animals are accepted at the landfill; they are incorporated into the bottom of the working face. The incorporation of the carcasses into the landfill is accomplished by pushing up the toe of the face and depositing the animal in the bottom of the toe; waste or a minimum of 12" of cover soil is then pushed over the top of the animal.

3.2.4.5 Asbestos Waste

Asbestos waste is not accepted at the TJL facility.

3.2.4.6 Grease pit and Animal Waste By-Products

Grease pit and animal waste by-products are not accepted at the TJL facility.

3.3 LIQUIDS RESTRICTIONS

3.3.1 Bulk or Containerized Liquid Waste

Bulk or containerized liquid waste will not be disposed of in TJL unless it is household waste (other than septic waste) or landfill gas condensate derived from TJL operations. Liquids restrictions are necessary because the disposal of liquids into landfills can be a significant source of leachate generation. By restricting the introduction of free liquids into the landfill, TJL can minimize the leachate generation potential of the landfill. This should reduce the quantity of free liquids to be managed in the landfill. The ban on containerized free liquids will also minimize the problem of subsidence and possible damage to the final cover upon deterioration of the waste containers. Leachate may be placed onto the lined landfill from the LCEP as a dust suppression technique or when the capacity of the LCEP is near the 12 inch of minimum freeboard level.

3.3.2 Household Waste

Restricting certain small volume liquids may be impractical and unnecessary to protect human health and the environment. For example, small amounts of liquid will be present in household wastes and may be difficult to effectively identify, separate, and restrict from disposal. The regulations allow disposal of products normally and reasonably associated with households or household activities that are in household containers (5 gallons or less). Spotters effectively remove all HHW from loads delivered to the PCC.

3.3.3 Leachate and MSWLF Gas Condensate

Leachate and gas condensate collected as part of the future gas recovery operations at TJL may be re-introduced into the lined landfill as a dust suppression technique or when the capacity of the LCEP nears the 12 inch freeboard levels. Operational experience of the leachate system over the

past years indicates that the LCEP has more than adequate capacity to store leachate produced by the landfill during the winter months.

3.3.3.1 Leachate Handling Procedures

Leachate is to be removed as directed by the Operations Manager. Because of the arid nature of the area, leachate removal has not been a practice. If TJL removes any leachate in the future, all Equipment Operators likely to be directly involved with the removal of leachate shall have initial and annual leachate handling training. The training documentation will identify the person receiving the training, date of training, and the name of the person providing the training. All training documents will be included in the operation record. Leachate shall be applied only to lined portions of the landfill only. Once leachate is loaded into the water truck, the entire load of leachate will be discharge onto the MSW located within the lined landfill. If the water truck is used for regular dust control in unlined areas, a full load of clean water will be placed on a lined cell area to clean the tank before the second clean load is used over unlined areas. The number of full loads of leachate reintroduced into the landfill will be reported to the Operations Supervisor for volume documentation.

3.3.4 Containers Holding Liquid Waste

Containers holding liquid waste will not be disposed of in the landfill unless the container is "household size (less than five (5) gallons).

3.4 MONITORING AND INSPECTION SCHEDULE

3.4.1 Groundwater

TJL has recently entered into a Corrective Action Program. The Modified Corrective Action Plan approved by DSHW details the groundwater monitoring. Appendix C – Modified Corrective Action Plan details the current groundwater assessment for TJL.

3.4.2 Surface Water

Drainage control problems can result in accelerated erosion of a particular area within the landfill. Differential settlement of drainage control structures can limit their usefulness and may result in a failure to properly direct storm water off-site. Drawing 7 (Final Cover) illustrates the location of the surface water drainage control systems designed to incorporate both existing topographical features as well as changes to the overall site layout. TJL staff will inspect the drainage system monthly. Temporary repairs will be made to observed deficiencies until permanent repairs can be scheduled. TJL or a contractor will repair drainage facilities as required. The facility shall not cause a violation of any Utah Pollution Discharge Elimination System permit or standards from the discharges of

surface water run-off, leachate or any liquid associated with the facility. The facility shall be in compliance with all provisions of the Clean Water Act.

The Storm Water Pollution Prevention Plan details the inspection and operational requirements. Appendix D contains the Storm Water Pollution Prevention Plan.

3.4.3 Leachate Collection

The leachate collection system, installed in the lined landfill Cells consists of a layer of drainnet (geosynthetic used for lateral flow of liquid) installed over the High Density Polyethylene (HDPE) and Geosynthetic Clay Liner (GCL) liners. The drainnet is covered by protective soils and MSW. No maintenance or inspection of the drainnet is required. The future leachate collection system components at TJL will incorporate leachate collection pipes and the associated cleanouts. Once leachate collection pipes and cleanouts are installed, they will be inspected no less than quarterly by TJL staff for signs of deterioration. TJL or a contractor will make required repairs. Cleanouts are being provided in the future cells to aid TJL in leachate management efforts.

3.4.4 Landfill Gas Collection System

All landfill disposal operations produce some quantity of gas as a result of waste decomposition. However, it has also been shown that by reducing the available water coming in contact with the waste materials the quantity of gas generation is also reduced. For TJL, the semi-arid environment, depth to groundwater and the operational restrictions of no liquid waste disposal will serve to minimize the gas quantities generated. Any future landfill facilities will be constructed away from landfilling operations and existing structures have been equipped with methane monitoring equipment.

Gas control and monitoring requirements are detailed in Section 315-303-3. Explosive landfill gasses shall be monitored quarterly and gas concentrations shall not exceed:

- 25% of the lower explosive limit for explosive gases in facility structures, excluding gas control or recovery system components.
- The lower explosive limit for explosive gases at the property boundary or beyond.

Landfill Gas inspection forms are included in Appendix E. TJL has not yet installed a Landfill Gas Collection System (LGCS). A LGCS will likely be installed by the end of 2004 as part of a landfill gas-to-energy program. When the LGCS is installed the system will be inspected quarterly according to those specifications and parameters listed in Utah Administrative Rules R315-303-2, Standards for Performance. The system will be repaired and parts replaced as required to maintain system capabilities.

The program described in Section 5.2.1.4 for inspecting and maintaining the gas monitoring system will be followed throughout the post-closure maintenance period. Quarterly maintenance will include cutting weeds in a 2-foot radius around each monitoring location.

3.4.5 Landfill Leachate Collection/Evaporation System

The LCEP collects the leachate from all lined Cells and holds the leachate until evaporated. The pond has been constructed utilizing liner components identical to the lined landfill Cells with a secondary layer of GCL incorporated beneath the primary GCL layer. The uppermost (primary) liner consists of 60 mil HDPE membrane underlain by a GCL. Drawing 9 (Details) illustrates the materials utilized in the construction of the LCEP.

The LCEP is located at the eastern edge (downgradient side) of the active landfill Cell. As new landfill Cells are constructed the location of the LCEP is moved accordingly. Drawing 2 (General Arrangement) and Drawing 3 (Sections – Existing) show the location of the current LCEP.

3.4.6 Inspection Documentation

The results of all routine inspections of site facilities will be recorded on inspection forms. The inspection forms will be submitted to the Operations Supervisor for inclusion in the landfill operating records as required in Section R315-302-2(5) of the Rules. Appendix E – Landfill Forms contains the forms utilized at TJL to document the landfill operations.

3.5 CORRECTIVE ACTION PLAN – GROUNDWATER

TJL has recently entered into the Corrective Action Program as detailed in R315-308. Appendix C – Modified Corrective Action Plan developed contains the approved corrective action plan for TJL.

3.6 CONTINGENCY PLANS

Contingency operations will be implemented should specific or unusual situations occur. The following subsections discuss such contingencies as fire, explosion, release of explosive gases, and failure of run-off containment. The Operations Manager and Operation Supervisors have cellular phones and radios which will serve as the on-site mobile communications system for use in an emergency to communicate with the management offices and off-site personnel. The telephones located in the scale house and operations office which will serve as the back-up communication system.

3.6.1 Fire

3.6.1.1 Open Burning

Open burning of solid waste is prohibited except for the infrequent burning of limited items (e.g., agricultural wastes, land clearing debris, diseased trees, and debris from emergency cleanup operations). The open-burning of these materials is not typically an ongoing practice and thus does not present a significant environmental risk.

EPA Subtitle D, Subpart C requires that TJL not violate applicable requirements of State Implementation Plans (SIPs) under Section 110 of the Clean Air Act (CAA). The CAA is the primary statutory authority for addressing air quality concerns. Section 111 of the CAA governs emissions from all MSWLF facilities. TJL understands that these infrequent acts of burning must be in compliance with applicable requirements under State of Utah SIPs and local open burning ordinances.

Open burning may be conducted in areas dedicated for that purpose at a distance from the active face of the landfill so as to preclude the accidental burning of other solid waste or damage to liner systems.

3.6.1.2 Vehicle Fires

In the event that a disposal vehicle carrying a burning or smoldering load of waste enters the landfill site the following actions will be taken:

- The vehicle will be directed to a designated section of the landfill, away from any exposed waste, and allowed to deposit the material. The designated area will vary depending on operational areas in use. The area will be readily accessible and within 1 or 2 minutes of the tipping area. The designated area will be isolated from the existing tipping area and will either be an excavated area with no underlying fill or at a location with a minimum of 1 foot of soil cover over underlying fill. In no case will a load thought to be burning be allowed to be dumped when the fill over the liner system is less than 10 feet thick.
- Once burning waste is removed from the vehicle, the application of cover soil by landfill earth-moving equipment or the application of water by the on-site water truck to extinguish the fire can be carried out. Smothering the fire with soil is the preferred method.
- Precautions will be taken throughout the entire fire-fighting operation including using a hot spot observer.
- If, at any time, additional assistance is required, local fire-fighting units will be contacted.

3.6.1.3 Ground Fire/Below Cover Fire

In the event that waste placed on the ground or waste that was previously covered erupts into fire the following actions will be taken:

- The waste on fire will be isolated from previously deposited waste as much as possible. This may be done by either moving burning wastes to another area or by concentrating the burning wastes using the landfill earth-moving equipment.
- Once burning material is separated from other exposed waste, the application of cover soil by landfill earth-moving equipment or the application of water by the onsite water tank truck to extinguish the fire can be carried out.
- Any vehicles and any equipment in the "fire zone" will be sprayed with water while working to quell the fire.
- Precautions should be taken throughout the entire fire-fighting operation, including using a hot spot observer.
- If, at any time, additional assistance is required, local fire-fighting units will be contacted.

3.6.2 Explosion

The concentration and subsequent ignition of landfill gas is not expected to be a significant problem at the site. In the event of an explosion at the landfill or in any structure associated with the landfill site the following actions will be taken:

- The affected area will be immediately closed and evacuated. All site equipment will be moved away from the scene, if possible.
- Access to the explosion area will be restricted to all non-emergency persons until cleared for re-entry by local emergency personnel.
- All landfill personnel will be accounted for.
- Local emergency personnel (fire, police) will be contacted and informed of the situation.
- The General Manager will be informed of the situation.
- A determination of the origin of the explosion will be made if possible. If the source
 of the explosion can be determined, monitors will be set up to help detect the onset
 of future discharges.
- The TJL General Manager or his designee will act as the Public Spokesman and will be the only employee authorized to make statements regarding the event.

3.6.3 Release of Explosive Gases

In the event that a release of explosive gases should occur at the landfill or in any structure associated with the landfill site the following actions will be taken:

- All personnel in the area, including those in surrounding buildings, will be evacuated immediately. In addition, site equipment will be moved away from the scene, if possible.
- All landfill personnel will be accounted for.
- Local emergency personnel (fire, police) will be contacted and informed of the situation.
- The General Manager will be informed of the situation.
- The release area and surrounding area will be monitored with a combustible gas indicator (CGI) by landfill personnel and readings documented for placement into the operating record.
- The area of the release will be restricted to all non-emergency persons until cleared for re-entry by local emergency personnel.
- Precautions should be taken throughout the entire emergency response operation.
- The TJL General Manager will provide the necessary notices to the Executive Secretary.

3.6.4 Failure of Run-Off Containment

In the event of a failure of the run-off containment system that has been designed to minimize the potential for off-site release of surface water that contacts operational portions of the landfill the following actions will be taken:

- Landfill personnel will immediately suspend filling operations, if containment failure is in an active fill area.
- Landfill personnel will use earth-moving equipment to construct temporary earthen berms in an effort to divert the flow of surface water away from the failure area and toward a holding area.
- The Operations Manager will conduct damage assessment. A decision will be made as to whether the damage can be rectified by on-site personnel.
- If the damaged area cannot be reconstructed by on-site personnel, TJL will contact a contractor to initiate repairs to the existing system.
- The TJL General Manager will provide the necessary notices to the Executive Secretary.

3.7 CONTINGENCY PLAN FOR ALTERNATIVE WASTE HANDLING

It is not anticipated that an alternative waste handling and disposal systems will be necessary. Based on historical operations and a history of never needing to close down the site, landfilling operations should not have to be suspended due to inclement weather conditions or interruption of service. The site soils, including those planned for daily cover, consist of silty to clayey gravel; these soils are

easily placed over a wide range of moisture and weather conditions. Additionally, flooding of the disposal area or access road is unlikely as this design has been arranged to provide positive drainage away from the facility at all times.

With the size of the landfill and the quantity of multi-use equipment available to the operators, equipment breakdown that would stop operations is unlikely. Alternate equipment could be hired on a temporary basis within 4 to 8 hours. TJL believes that their past operating experience and cautious operating procedures will negate the need for alternate waste handling plans.

In the event of a major unforeseen circumstance, waste could be diverted to the S.L. County landfill.

3.8 MAINTENANCE PLAN

The following subsections offer a description of the maintenance of installed equipment including groundwater monitoring systems and leachate and future gas collection systems.

3.8.1 Groundwater Monitoring System

The groundwater monitoring system that has been monitored since March of 1994 is no longer functional. Four (4) of the five (5) wells have become dry; Appendix C – Modified Corrective Action Plan summarizes the changes in the groundwater monitoring program at TJL. No maintenance of the groundwater wells is planned.

3.8.2 Leachate Collection and Recovery System

The Leachate Collection and Recovery System (LCRS), installed as part of the lined landfill design, must be maintained so that it operates during the operational life and closure and post-closure period. The system will be inspected no less than quarterly by TJL staff for signs of deterioration. TJL or a contractor will make required repairs. Future cleanouts can be used to internally inspect the main collection pipe when it is installed using in-line camera equipment. If necessary, these cleanouts can also be used to jet the pipe clean to re-establish flow. The drainnet installed as part of the LCRS is not required to be inspected or maintained.

3.8.3 Landfill Gas Collection System

The landfill gas collection system (when installed) will be inspected no less than quarterly. The gas collection system will be repaired and parts replaced as required to maintain system capabilities. The program described below for inspecting and maintaining the gas collection system will be followed during the post-closure maintenance period.

Quarterly maintenance will include cutting weeds in a 2-foot radius around each well. Preventive maintenance will be performed on all mechanical equipment at manufacturer-recommended intervals. These tasks include cleaning, lubrication, and replacement of worn parts.

3.8.4 Facilities

Signs, roads, fences, etc, will be inspected on a monthly basis and repairs made as necessary.

3.9 DUST, LITTER, DISEASE AND VECTOR CONTROL

3.9.1 Dust Control

Unsightliness, dust, and odor will be controlled by (1) timely placement of daily, intermediate, and final soil cover over the refuse fill; (2) proper maintenance of haul roads (grading and watering); (3) application of water spray or dust palliative on soil-covered work areas, soil excavation areas, and soil stockpile areas where conditions may result in fugitive dust; (4) application of water or planting of temporary vegetation on intermediate soil cover when conditions might create fugitive dust; and (5) planting and maintenance of vegetated cover on completed fill slopes.

While the landfill is in operation, placing daily and intermediate soil cover will control odors from the refuse. The installation of the low-permeability layer and landfill gas collection system of the final system should effectively control odors.

3.9.2 Litter Control

The Operations Manager will continue the ongoing litter collection program in order to minimize the impacts of litter on and surrounding the site. This program consists of various activities designed to reduce windblown litter, as well as other site features and operations that help to reduce windblown litter.

TJL has instituted the following activities specifically designed to reduce amounts of windblown litter:

- Requiring all loads of waste delivered to the landfill be fully tarped. Waste loads
 delivered to the landfill that are not fully tarped are charged at double the standard
 tippage rate. The requirement to fully tarp and secure loads will minimize the
 potential for debris blowing out of vehicles.
- Minimizing the size of the active face, reduces the area of wastes exposed to wind.
- Maintaining permanent perimeter fencing and erecting temporary litter fences downwind from the active face. The height and length of the temporary fences can be adjusted to maximize their effectiveness in trapping windblown litter.
- Timely application of daily and intermediate soil cover.

• Compaction of refuse layers at a maximum thickness of 2 feet to hold freshly deposited refuse to underlying landfill layers.

Site and surrounding area inspections will be conducted routinely and any windblown litter found will be collected. Debris will continue to be collected from the sides of the roads leading to the landfill. The landfill personnel will continually patrol the fence line both inside and outside to collect wind blown debris.

3.9.3 Disease and Vector Control

TJL personnel will use appropriate technologies to prevent or control on-site populations of disease vectors (e.g., rodents, insects) in an effort to protect human health and the environment. TJL personnel will be responsible for maintaining control of vectors at the landfill through continued use of appropriate daily cover procedures. Professional extermination personnel and services may be used to control vectors if it is found that daily operation procedures are insufficient.

The primary method of vector control is to eliminate conditions favorable for the production of vectors through proper compaction and daily covering as described in Part III of this permit application. Should the landfill personnel notice the presence of vectors, cover material will be applied more frequently. Pesticides will only be used as necessary, and very sparingly.

As with vector control, the preliminary method of controlling birds is to eliminate conditions favorable to their existence. This can be accomplished by utilizing, but not limited to, one or more of the following methods:

- Minimizing the size of the fill face; this is the most effective control method. This, along with more frequent and heavier compaction and frequent covering of the waste, will reduce the area available for the birds to feed.
- Avoiding the accumulation of water in depressions, ponds, or holding areas near the fill.
- Using noise-frightening or other techniques that provide a solution.

3.10 WASTE INSPECTION/EXCLUSIONS

A waste control program designed to detect and deter attempts to dispose of hazardous and other unacceptable wastes will continue to be implemented at TJL. The program is designed to protect the health and safety of employees, customers, and the general public, as well as to protect against contamination of the environment.

The landfill is open for public and private disposal. Signs posted near the landfill entrance clearly indicate (1) the types of wastes that are accepted; (2) the types of wastes not accepted at the site; (3) hours of operation; and (4) the emergency phone numbers.

All vehicles delivering wastes to the site must stop at the scalehouse. Commercial waste haulers are required to comply with the rules established by TJL and can lose the right to use the facilities if they violate these rules. Scalehouse personnel will inquire as to the contents of each incoming load to screen for unacceptable materials. Any vehicle suspected of carrying unacceptable materials (liquid waste, sludges, or hazardous waste) will be prevented from entering the disposal site unless the driver can provide evidence that the waste is acceptable for disposal at the site. TJL reserves the right to refuse service to any suspect load. Vehicles carrying unacceptable materials will be required to exit the site without unloading. If a load is suspected of containing unacceptable materials, the following information will be recorded: date, time, name of the hauler, driver, telephone number, license plate, and source of waste. The scalehouse will then notify the tipping area attendants by radio that a load is suspect and that load will be further inspected at the landfill tipping area before final disposal is allowed.

After a vehicle leaves the scalehouse, site personnel will route the vehicle to the appropriate discharge location. Loads will be regularly inspected at the tipping area. If a load contains inappropriate or unacceptable material, the driver will be required to reload the material and remove it from the landfill site. If the driver is not immediately identified, the area where the unacceptable material was discharged will be cordoned off. The unacceptable material will be moved to a designated area for identification and preparation for proper disposal. If landfill personnel discover regulated hazardous or PCB waste, TJL will ensure that the wastes are treated, stored, or disposed of in accordance with RCRA, and/or applicable State of Utah requirements.

TJL will also conduct detailed inspections of loads delivered to the landfill. The detailed inspections will be conducted on a random basis designed to detect illegal or inadvertent disposal of unacceptable wastes. The working face spotter will visually observe every load during tipping and a minimum of 1% of all loads entering the landfill will be screened in detail. The scalehouse software randomly (approximately each 30 loads) notifies the scalehouse attendant that an inspection is required. The scalehouse attendant notifies the Spotter who notifies the driver of the selected load that an inspection of the load is required. The Spotter will direct the driver to the proper location to discharge the load.

The selected load will be spread using the compactor or dozer to a maximum thickness of 1 foot. TJL personnel trained in waste screening will perform a detailed inspection of the load to determine if unacceptable materials are present in the waste.

If there are unacceptable wastes in a load, the inspector will determine whether the driver should have been aware of the unacceptable wastes. If the driver could or should have recognized the unacceptable wastes, the inspector will issue a violation notice; if the unacceptable wastes are camouflaged, no violation notice will be prepared; however, the driver will be consulted and the route will be determined. For commercial haulers, the first violation for unacceptable wastes will result in a warning to the hauler; the second violation will result in suspension of landfill access. TJL will issue a warning to the company on the suspension of any driver(s). In addition, TJL will warn companies if repeated, apparently intentional violations are suspected; the warning will specify the violation under consideration, the action(s) required by the company, and the penalty(s) for additional violations. TJL may suspend all disposal privileges at TJL facilities of companies that repeatedly violate TJL rules. A suspended driver or company may not use the landfill during the period of the suspension.

The SLVHD and the General Manager will be notified if an unacceptable waste is discovered at the facility. The General Manager will be responsible for notifying the Executive Secretary of the Division of Solid and Hazardous Waste, and the transporter of the waste within 24 hours of discovery. This notification will include the date of discovery, type of unacceptable waste, approximate volume, and depth and location within the landfill. A copy of notification will be retained in the landfill operating record. If hazardous or PCB-containing waste is discovered, the Operations Manager will also restrict the inspection area from public access and from facility personnel, and will assure proper cleanup, transport, and disposal of the waste.

Following is a list of unacceptable wastes:

- Hazardous wastes (excepting those wastes that are normally and reasonably associated with households or household activity that are in household containers (5 gallons or less)).
 Examples of hazardous wastes include:
 - 1. Lead acid batteries (automobile, boat, RV).
 - 2. Paint thinner, degreasing solvents, used oil or kerosene, or unrinsed container thereof.
 - 3. Pesticides, herbicides, or unrinsed containers thereof.

4. Fluorescent light ballasts (non PCB labeled), electrical transformers, or fluids from these.

(These items listed to this point are directed to the HHW facility if they are of a residential nature. All business hazardous waste generators are directed to the Salt Lake County HHW facility which is equipped to process small generator waste.)

- Radioactive materials or materials contaminated by radioactive substances.
- Acutely hazardous waste, per 40 CFR 261.33.
- Wastes containing PCBs.
- Friable asbestos containing materials.

3.11 RECYCLING PROGRAM

TJL maintains bins and segregates recyclable materials at the PCC. TJL currently (based on market) maintains bins for segregation of greenwaste, steel, aluminum, tires, batteries, paper and carpet pad. When the bins are full, they are all hauled from the site for recycling.

A horizontal grinder is located at the SVWRF greenwaste facility to grind clean material as a feed stock for a bio-solid composting operation owned and operated 100% by SVWRF.

TJL is actively encouraging all users of the landfill to take all clean green waste to the grinding facility. Incentive for waste diversion is achieved through a reduced tippage at the grinding site. The Scalehouse personnel and site signage directs the appropriate vehicles to SVWRF. This material is then used in landfill reclamation operations and may be purchased by the general public.

3.12 TRAINING PROGRAM

Personnel at the landfill are placed into broad classes based upon the work duties to be performed. In general, all landfill personnel will be required to complete a 40-hour HAZWOPPER training class and annually complete an associated 8 hour refresher. TJL personnel will keep First Aid/CPR training current. Operation Supervisors will maintain current SWANA -MOLO training. Operation Supervisors will also attend select classes on landfill monitoring, landfill safety, and general OSHA safety training. Formal job descriptions and work procedures are being developed to guide each of the landfill personnel through a job orientation and evaluation process.

TJL personnel are trained on how to identify unacceptable waste including liquid wastes, sludge, potential regulated hazardous waste, and PCB wastes. The training will emphasize methods of identifying containers and labels typical of hazardous and PCB waste. Training will also address the proper handling of unacceptable waste. All employees will receive on the job training in landfill operations and waste screening. This training will include operations and safety training. New

employees will receive initial training before starting work and full HAZWOPPER training during their first six (6) months of employment.

3.13 RECORDKEEPING

TJL personnel will maintain an operating record (pursuant to the State of Utah Administrative Rule R315-302) which is available at the landfill office. The operating record will include at a minimum the following information:

- The weight or volumes of each vehicle, daily number of vehicles entering the landfill and if available, the types of wastes received.
- List of the deviations in operation from the approved Plan of Operation.
- Training and notification procedures.
- Ground water sampling and analysis results.
- Gas monitoring results.
- Site inspection log.
- Other records as indicated in Section R315-302-2.

In addition to the Operating Record, the following data is maintained on site:

- Closure Plan.
- Post-Closure Plan.
- Cost estimates and Financial Assurance.

Records will be kept throughout the life of the facility, including the post-closure care period. Documents will be organized, legible, dated, and signed by the appropriate personnel. The information in the operating record will be available to citizens through the Utah Government Records Access Management Act (GRAMA).

3.14 SUBMITTAL OF ANNUAL REPORT

TJL will submit a copy of its annual report to the Executive Secretary by March 1 of each year for the most recent calendar year of facility operation. The annual report will include facility activities during the previous year and will include, at a minimum, the following information:

- Name and address of the facility.
- Calendar year covered by the report.
- Annual quantity, in tons or volume, in cubic yards, and estimated in-place density in pounds
 per cubic yard of solid waste handled for each type of treatment, storage, or disposal facility,
 including applicable recycling facilities.
- Update to the financial assurance mechanism.

- Ground water monitoring results.
- Gas monitoring results.
- Results of leachate system monitoring and disposal.
- Training programs completed.
- Statement on changes or modifications to the Corrective Action Plan.

3.15 INSPECTIONS

The Operations Manager, or his/her designee, will inspect the facility to prevent malfunctions and deterioration, operator errors, and discharges that may cause or lead to the release of wastes to the environment or to a threat to human health. These inspections will be conducted on a quarterly basis, at a minimum. An inspection log will be kept as part of the operating record. This log will include at least the date and time of inspection, the printed name and handwritten signature of the inspector, a notation of observations made, and the date and nature of any repairs or corrective actions. Inspection records will be available to the Executive Secretary or an authorized representative upon request.

3.16 RECORDING CLOSURE WITH COUNTY RECORDER AND THE STATE OF UTAH DIVISION OF SOLID AND HAZARDOUS WASTE

Plats and other data, as required by the County Recorder, will be recorded with the Salt Lake County Recorder as part of the record of title no later than 60 days after certification of closure. Additionally, TJL will submit proof of record of title filing to the Executive Secretary.

3.17 STATE AND LOCAL REQUIREMENTS

TJL will maintain compliance with all applicable state and local requirements including zoning, fire protection, water pollution prevention, air pollution prevention, and nuisance control. The South Jordan Current Zoning and Future Land Use Plans are included in Appendix F – Local Zoning.

3.18 ASBESTOS CONTAINING MATERIALS

TJL does not knowingly accept waste materials containing friable asbestos.

SECTION 4 - CLOSURE PLAN

This section describes the final cover construction, site capacity, schedule of closure implementation, estimated costs for closure, and final inspection procedures for the existing and new expansion phases of TJL.

4.1 CLOSURE STRATEGY

The majority of the north slope of the unlined landfill is closed and has been capped with the final soil cover. Appendix G – Test Pit & Boring Info. / Geologic Maps shows the locations of the test pits excavated to document the depth of the final soil cover. The thickness of the final soil cover; at all test pit locations indicated, exceeded the 5 foot minimum thickness.

The northwest area of the unlined landfill (above the side slopes) will be capped during closure Phase A. Final cover will be constructed in a series of 8 separate Phases. When sufficient area of the lined landfill Cells has reached final elevation to allow for economical placement of final cover, approximately 20 acres, that portion of the landfill will be closed. Drawings 4 & 5 (Future Landfill Development) shows the approximate extent of each of the closure Phases. Drawing 8 (Final Landfill Section & Landfill Life) shows the section view of the landfill closure Phases and the projected landfill life. The projected date of final closure of the entire landfill, based on current waste streams, is 2029. It is projected that approximately 16.1 million tons (24.8 million cubic yards) of municipal solid waste will be placed in the lined and unlined landfill cells at the time of closure.

The Executive Secretary will be notified in writing at least 60 days prior to the anticipated last receipt of waste in accordance with R315-302-3(4)(a). Implementation of the final closure Phase will begin within 30 days after last receipt of waste. Final Closure of the entire landfill will be completed within 180 days of implementation of closure activities, unless an extension has been granted by the Executive Secretary.

4.2 FINAL COVER DESIGN AND INSTALLATION

The Phasing of the final cover system for the unlined landfill and Phases B through H of the lined landfill cells are as indicated on Drawings 4 & 5 (Future Landfill Development). A preliminary design package consisting of drawings, specifications, and QA/QC plan will be prepared and submitted to the State of Utah DSHW for review and approval prior to each cover placement event. A final closure certification package will be issued prior to final closure of the facility to ensure compliance with federal and state regulations effective at the time of closure. The conceptual final

cover design described herein is in accordance with current State of Utah regulations and RCRA Subtitle D criteria. The final cover system is designed to control the emission of landfill gas, promote the establishment of vegetative cover, minimize infiltration and percolation of water into the waste, and minimize the erosion of the final cover soils throughout the post-closure care period and beyond. Drawing 7 (Final Cover) shows the final topography for the landfill; Drawing 8 (Final Landfill Section & Landfill Life) shows a section view through the closure Phases of the landfill and Drawing 9 (Details) shows the section view of all final cover systems to be utilized in the closure of the landfill.

4.2.1 Unlined Landfill (Phase A)

The closure of the unlined landfill will consist of the closure of the side slopes (90% of them facing north) and the closure of the top area. The unlined landfill currently extends to an approximate elevation of 5200 feet. The ultimate height of the landfill will be approximately 5250 feet. As state previously, the majority of the north slopes (extreme north edge) of the unlined landfill has received final cover. The final cover for the north slopes of the unlined landfill consists of the following soil layers beginning from bottom to top:

- At minimum of 60 inches of native soil cover.
- Additional 6-12-inch layer of soil cover consisting of native soils suitable for plant growth

The top areas (areas of the unlined landfill above the side slopes) of the unlined landfill will be closed in an incremental manner. Closure Phase A will provide final cover to the bulk of the unlined landfills top area. Closure Phase A is shown on Drawing 5 (Future Landfill Development). The balance of the unlined landfill will be closed incrementally in Phases B through H.

The area of the landfill that was the old entrance will be covered with GCL since the area received waste after the July 15, 1993 date. The installation of the GCL will be coincident with the next Phase of landfill closure (Phase B) estimated to be completed in the summer of 2005. Details of the GCL cover will be submitted with the design package for Phase B.

4.2.2 Phases B through H

The final cover for the remainder of the landfill, which consists of the south portion of the unlined landfill and the area over the lined cells 1 through 6, will be covered in seven additional construction Phases over the life of the landfill. The following final cover constituents are conceptually planned, beginning from bottom to top:

 A minimum of 12 inches of intermediate native soil cover (which will serve as a gas control layer).

- A reinforced GCL.
- A 60 mil textured HDPE membrane.
- A drainnet drainage layer (geonet sandwiched between two geotextile fabrics).
- A 36-inch protective soil layer, the upper of 6 inches of which will consist of native soils suitable for plant growth.

The protective soil layer will consist of native soil materials placed and track compacted to minimize maintenance efforts. The top 24 inches of protective soil layer; in particular the upper 6 inches, will be the vegetative zone of the cover capable of supporting vegetation.

4.2.3 Seed, Fertilizer and Mulch

The 6-inch vegetative layer of the cap will be seeded with a mixture of grasses suitable for fast growth in the region, then fertilized and mulched. TJL will utilize the Kennecott seed mixture that has been used in the adjacent Kennecott land reclamation. The recommended seeding fertilizing and mulching requirements are outlined below:

The final cover area will be seeded using drill/pit seeding techniques. Seed will be applied at a rate of 24 pounds of pure live seed per acre. The seeded area will be fertilized with commercial, granular type fertilizer that provides 40 pounds of available nitrogen per acre with a 28N:13P:13K blend. Seed includes an equal mix of western wheatgrass, thickspike wheatgrass, slender wheatgrass and streambank wheatgrass.

TRM's (turf reinforcement mats) will typically be placed in areas of concentrated runoff and/or drainage channels.

Early establishment of vegetation on the landfill's final slope surface will impede soil erosion and promote evapotranspiration. TJL will periodically evaluate vegetative growth, vigor, and color so that the integrity of the final cover system is maintained. If stress signs on vegetation caused by landfill gas and leachate seeps are noted, the problem will be corrected. Corrective procedures will be conducted based on current design recommendations and will be built consistent with construction specifications. TJL staff or a licensed landscape contractor will make repairs, as necessary.

4.2.4 Landscaping

The landfill facility, including all surrounding grounds, will be maintained in conjunction with any scheduled maintenance activities (i.e., road improvements, etc.). The landscape of the landfill will

be designed to be both functional and aesthetically pleasing.

4.2.5 Contouring

The landfill's final grades will be inspected and maintained in order to ensure its integrity and conformity with the conceptual final cover plans that are included on Drawing 7 (Final Cover).

Any areas where water has collected (ponded) will be regraded. Erosion damage resulting from extremely heavy rainfall will be repaired. TJL staff will inspect the final grading no less than quarterly.

4.2.6 Quality Assurance/Quality Control (QA/QC) Procedures

For construction of the final landfill cover, drawings, specifications and QA/QC procedures will be developed by a Utah licensed Professional Engineer and submitted to the State of Utah DSHW for review and approval prior to construction of each closure Phase.

4.3 CLOSURE COST ESTIMATES

The current cost estimates for the closure of the TJL operation is provided in the financial assurance portion of the 2003 annual report. Appendix H – Closure/Post Closure Costs presents the costs anticipated for the closure of the future Phases.

Section 2.9 of Part III details the Financial Assurance considerations for the TJL facility.

4.4 CERTIFICATION OF CLOSURE AND RECORD KEEPING

A Utah licensed Professional Engineer will be retained to supervise closure of each of the closure Phases. The registered engineer will be employed by TJL, or will be a TJL-hired consultant and will certify the landfill was closed according to the closure plan. Any amendment or deviation to the closure plan will be approved by the Executive Secretary and any associated permit modifications will be made. Final closure work and documentation will be observed and reviewed by DSHW personnel as necessary.

As part of the certification process, the engineer shall also provide closure as-built drawings to the Executive Secretary within 90 days following completion of closure activities.

Additionally, the final plats and the amount and location of waste will be recorded on the site title. The owner will file the notarized plat with the county recorder within 60 days following certification of closure.

SECTION 5 - POST-CLOSURE PLAN

Post closure activities will begin when closure is approved by the Executive Secretary. The following presents the post-closure plan for TJL.

5.1 MONITORING PROGRAM

The following subsections offer a description of the monitoring program, which includes groundwater monitoring, leachate and gas collection systems.

5.1.1 Groundwater Unlined and Lined Landfill

Groundwater is currently monitored as detailed in the approved Groundwater Monitoring Plan (Part III, Section 2). TJL will continue a groundwater monitoring program as detailed in the Modified Corrective Action Plan. Appendix C – Modified Corrective Action Plan contains the approved corrective action plan.

5.1.2 Surface Water

Although no surface water sampling activities are scheduled for the landfill, TJL staff will inspect the drainage system no less than quarterly. Temporary repairs to any observed damage will be made until permanent repairs can be scheduled. TJL or a licensed general contractor will replace drainage facilities, if necessary.

Currently, a semi-annual statement is required to be sent to Utah Department of Water Quality for any discharges. Appendix D – Storm Water Pollution Prevention Plan specifies the storm water handling and documentation requirements.

5.1.3 Leachate Collection and Treatment

5.1.3.1 Unlined Landfill

A leachate collection system was neither required nor installed during utilization of the unlined landfill.

5.1.3.2 Lined Landfill

All leachate collection and treatment structures will be monitored no less than quarterly and will be conducted more often if the need arises.

5.1.4 Landfill Gas

Landfill gas monitoring wells have been installed around the north and west perimeter of the landfill

site to monitor explosive landfill gas emissions from both the unlined and lined landfill cells. The gas monitoring wells, as well as all structures at the site, will be monitored quarterly to ensure compliance with State regulations regarding explosive landfill gas.

During post-closure; TJL landfill personnel or a contracted company will be responsible for the inspection and sampling of all methane gas monitoring wells, facility structures, and gas collection system components. Monitoring will occur no less often than quarterly and will be conducted more often if the need arises. In the event that a sample exceeds the regulatory level, TJL personnel will notify the DSHW immediately and undertake appropriate corrective actions.

As outlined in R315-303-3(5), TJL will take all the necessary steps to protect human health and will immediately notify UDEQ of explosive gas levels detected above allowable levels and actions to be taken. Also, within 7 days of incident, TJL will place in the operating record documentation of the explosive gas levels detected and a description of the interim steps taken to protect human health. Within 60 days of detection, TJL personnel will implement a remediation plan for the explosive gas releases, place a copy of the plan in the operating record, and notify UDEQ that the plan has been implemented. The remediation plan will describe the nature and extent of the problem and the proposed remedy.

5.2 MAINTENANCE PROGRAM

The following subsections offer a description of the maintenance of installed equipment, including groundwater monitoring systems and leachate and gas collection systems.

5.2.1 Monitoring Systems

5.2.1.1 Groundwater

All current and future groundwater monitoring wells will be inspected for signs of failure or deterioration during each sampling event. If damage is discovered, the nature and extent of the problem will be recorded. A decision will be made to replace or repair the well. Possible repairs include redevelopment, chemical treatment, partial casing replacement or repair, sealing the annulus, or pumping and testing. If a well needs to be replaced, it will be properly abandoned. Damaged wells will be scheduled for repair or replacement.

5.2.1.2 Surface Water

Drainage control problems can result in accelerated erosion of a particular area within the landfill. Differential settlement of drainage control structures can limit their usefulness and may result in a failure to properly direct storm water off-site.

Implementation of a post-closure maintenance program will maintain the integrity of the final drainage system throughout the post-closure maintenance period. The final surface water drainage system will be evaluated and inspected, no less than quarterly, for ponded water and blockage of and damage to drainage structures and swales. Where erosion problems are noted or drainage control structures need repair, proper maintenance procedures will be implemented as soon as site conditions permit so that further damage is prevented. Damaged drainage pipes and broken ditch linings will be removed and replaced.

TJL staff will inspect the drainage system no less than quarterly. Temporary repairs will be made until permanent repairs can be scheduled. TJL or a licensed general contractor will replace drainage facilities.

5.2.1.3 Leachate Collection and Treatment

The leachate control and recovery system must be maintained so that it operates during the postclosure maintenance period. The system will be inspected no less than quarterly by TJL staff for signs of deterioration. TJL or a licensed contractor will make required repairs.

5.2.1.4 Landfill Gas

The landfill gas monitoring system will be regularly inspected in conjunction with the scheduled monitoring tasks. The system will be repaired and parts replaced as required to maintain system capabilities.

The landfill gas monitoring system will be inspected quarterly throughout the post-closure period. Quarterly maintenance will include cutting weeds in a 2-foot radius around each monitoring location.

5.2.1.5 Final Grading

The landfill cover final grade will be inspected no less than quarterly and maintained in order to preserve its integrity. Evaluation and inspection of the cover final grades will include evaluations of vegetation and overall system performance. At the completion of closure activities, the surface of the cover will be surveyed to provide a reference point for monitoring settlement.

Areas where water has collected (ponded) will be regraded. Erosion damage resulting from extremely heavy rainfall will be repaired.

5.2.2 Facility and Facility Structures

Drawing 2 (General Arrangement) shows the locations of all current and proposed facility structures.

5.2.3 Cover and Run-On/Run-Off Systems

The final cover system will incorporate features to manage storm water, minimize erosion, and provide for efficient removal of storm water collected in the drainage layer. Drawing 7 (Final Cover) shows proposed final grades and illustrates the extent of storm water collection and surface water and erosion control systems on the surface of the cap.

The constructed cap will convey collected water via earthen dikes, swales, and drainage channels to the detention basin.

Placement of all permanent drainage facilities will be completed during, or immediately following, installation of the final soil cover. Permanent drainage facilities will be designed to provide adequate drainage after settlement of the fill area(s). The detention basin will allow settlement of sediments contained in the storm water run-off. Section 2.5 of Part III describes the details of the run-on and run-off control system.

5.3 SCHEDULE OF POST-CLOSURE ACTIVITIES

Post-closure activities, consisting of monitoring and maintaining the final cover and permanent drainage facilities, will be implemented periodically as areas of the landfill are filled to final grade.

5.4 POST CLOSURE COST ESTIMATES

Updated cost estimates for Post Closure care for the TJL facility will be provided in the financial assurance portion of the annual report. Appendix H – Closure/Post Closure Costs presents the costs anticipated for various Closure and Post Closure activities.

Section 2.9 of Part III details the Financial Assurance considerations for the TJL facility.

5.5 CHANGES TO RECORD OF TITLE, LAND USE, AND ZONING

TJL will notify the Salt Lake County Recorder's Office at any such time when there is a change to the Record of Title, land use plan, or zoning restrictions. In addition, TJL will notify the Recorder at that time when the post-closure care period has expired.

5.6 POST CLOSURE FACILITY CONTACTS

TJL will likely maintain a maintenance person responsible for the Post Closure facility operations. However; if TJL does not have a dedicated contact person, the City Administrator of South Jordan will be the designated point of contact for the facility. The telephone number for the City Administrator is (801) 254-3742.

5.7 POST CLOSURE LAND USE

Appendix O – Future Land Use contains the current master plan for the lands surrounding the TJL facility.

APPLICATION TO RENEW A PERMIT TO OPERATE A CLASS I LANDFILL

Trans-Jordan Landfill

March 31, 2004 (Revised April 20, 2005)

PART III - TECHNICAL REPORT

Trans-Jordan Cities 10873 S. 7200 West PO Box 95610 South Jordan, Utah 84095-0610 Tel: (801) 569-8994

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SECTION 1 - GEOHYDROLOGICAL ASSESSMENT

1.1 GEOLOGY AND HYDROLOGY

1.1.1 Regional Geology

Trans-Jordan Landfill (TJL) is located at an elevation of approximately 5,000 to 5,250 feet in the southwest portion of the Salt Lake Valley. This valley represents a deep, sediment-filled structural basin of Cenozoic age flanked by two uplifted blocks, the Wasatch Range on the east and the Oquirrh Mountains to the west (Hintze, 1980). The northern portion of the Salt Lake Valley extends beyond the northern limits of the Oquirrh Mountain range and is bordered on the west by the southeast shore of the Great Salt Lake. The Wasatch Range is the easternmost expression of pronounced Basin and Range extension in north-central Utah. Appendix G – test Pit & boring Info. / Geologic Maps includes the geologic map of the Central Wasatch front.

1.1.2 Local Geology

The near-surface geology of the Salt Lake Valley is dominated by sediments, which were deposited within the last 30,000 years by Lake Bonneville (Scott and others, 1983; Personius and Scott, 1992; Hintze, 1993). As the lake receded, streams began to incise large deltas formed at the mouths of major canyons along the Oquirrh and Wasatch ranges, and the eroded material was deposited in shallow lakes and marshes in the basin and in a series of recessional deltas and alluvial fans. Sediments toward the center of the valley are predominately deep-water deposits of clay, silt and fine sand. However, these deep-water deposits are in places covered by a thin post-Bonneville alluvial cover. Surface sediments at the project site are mapped as Pleistocene lacustrine shore facies sand and gravel consisting of clast-supported pebble, cobble and rarely boulder gravel in a matrix of sand and pebbly sand (Davis, 1983; Personius and Scott, 1992). These sediments were deposited during the transgressive phase of the Lake Bonneville cycle approximately 30 to 14 ka (thousands of years ago).

1.1.3 Hydrology

TJL is located in alluvial outwash material located two to three miles from the east slope of the Oquirrh Mountains near the mouth of Bingham Canyon. Bingham Creek runs out of Bingham Canyon and has incised into the alluvial outwash from the canyon. The creek runs along the north side of the landfill. The landfill terrain slopes northward toward the creek with an elevation drop of approximately 100 to 150 feet. Local runoff may travel over short distances, but does not appear to transport flash flood waters/debris flow of significant volume over long distances. This is apparent due to the lack of recent erosion in the areas surrounding the site.

1.2 SOIL AND BEDROCK CHARACTERISTICS

West of the landfill area are the mining operations of the Bingham Canyon Mine owned by Kennecott Utah Copper (KUC) which is located at the confluence of Bingham Canyon and Carr Fork. The Bingham Mining District has been developed in intrusive and meta-sedimentary rocks. Copper, molybdenum, gold, and silver mineralization usually occur as replacement deposits in the meta-sedimentary and sedimentary rocks, particularly limestone, of the Pennsylvanian Bingham Mine Formation.

Major geologic units identified in the study area by Dames & Moore (May 1988) include the lower clays and mudstones, which underlie semi-consolidated sediments which in turn underlie upper unconsolidated sediments. The clays and mudstones underlie much of the site as do the semi-consolidated Tertiary deposits. The unconsolidated Quaternary deposits increase in thickness from the mountain front of the Oquirrhs toward the valley center.

The clays and mudstones are typically massive thicknesses of moist clays with interbedded "hard" clayey gravels. Thicknesses of the consolidated clays may be as great as 2,000 feet. These sediments are not part of the principal aquifer which lies above this unit.

The semi-consolidated sediments are calcium carbonate-cemented sediments typically referred to by drillers as "hard or hardpan, cemented conglomerate or sandstone." Although not all of these semi-consolidated sediments are strongly cemented, they are much more consolidated than the unconsolidated sediments found directly above them. The thickest accumulations of semi-consolidated sediments are present beneath Bingham Creek where thicknesses exceed 500 feet. The aquifer which underlies TJL is located primarily in this geologic unit.

The unconsolidated sediments are the youngest sediments in the area and were deposited in alluvial, fluvial and lacustrine environments.

Sediment from the mouth of Bingham Canyon has been deposited in a large alluvial fan out into the Jordan River Valley. Much of this alluvial fan formed during the time that Lake Bonneville filled much of the Jordan River Valley thus the unconsolidated sands and gravels from Bingham Canyon are interbedded with the sediments of ancient Lake Bonneville. The alluvium is usually poorly sorted sandy gravels roughly stratified with silt and clay layers. Volcanic ash deposits are interbedded with the gravels in numerous places.

The subsurface conditions encountered during the geotechnical investigation performed for the lined cells at TJL were characterized from the field exploration and the laboratory test programs. Soil

conditions are predominantly silty-clayey gravels at and near the ground surface with both well graded and silty gravels under the silty-clayey gravels. Occasional lenses of silty clays were encountered but they do not extend continuously across the landfill area. Some sand deposits were also encountered but they are isolated in small scattered areas. Excavations at the east end of the landfill area indicate primarily clayey gravels underlain by a deposit of silty clays/clayey silts. Site investigations were not able to document the extent of the silty clays/clayey silts.

Boreholes TJ-1 through TJ-6 were drilled along the south side of the old Bingham Creek outwash channel at the locations shown on the location map in Appendix G. At the surface these soils are light brown sandy silty and clayey gravels, which are dense to very dense, with occasional zones of silty clay, clayey silt, and silty sand. These gravels appear to be part of the outwash deposits on the alluvial fan east of Bingham Canyon. Hollow-stem auger refusal occurred in very dense clayey or silty gravels with scattered cobbles and small boulders at depths ranging from 39.5 feet to 70 feet. No ground water was encountered in any of the boreholes. Natural moisture content of soil samples from depths of 10 to 20 feet ranged from 7.7 to 12.1 percent.

In the bottom of the old Bingham Creek outwash channel, at boreholes TJ-1 through TJ-6 there is a surface layer of clayey gravel with some thin lenses of silty gravel, silty clay, and silt ranging in depth from 9 to 37 feet. These gravels are dense to very dense with natural moisture content of between approximately 8.0 to 12.0 percent.

Below approximately 10.0 to 30.0 feet the soil materials were all dense to very dense clayey gravel to silty gravel with some poorly sorted gravel. No lenses of silt or clay were noted. Average natural moisture content was 6.9 percent.

On the higher ground south of the outwash channel there is approximately 30 feet of silty sands and gravels. Below 30 feet in depth are silty gravels to well sorted gravels. These materials are described on the log of borehole TJ-7. Down-slope, at the location of borehole TJ-8, the soil is primarily dense to very dense poorly graded silty and clayey gravel. At a depth of approximately 40 feet in borehole TJ-8 a 6 foot thick lens of silt or low plasticity clay was encountered. Appendix G – Test Pit & Boring Info. / Geologic Maps depicts the soils encountered during the initial geotechnical investigation at TJL.

1.3 HYDROGEOLOGY AND GROUNDWATER

1.3.1 Hydrogeology

Four studies conducted by the United States Geological Survey (USGS) since 1905 (Richardson, 1906; Taylor and Leggette, 1949; Hely and others, 1971; and Waddell and others, 1987) each

described the hydrogeology of the Salt Lake and Jordan Valleys in terms of an unconfined deep aquifer near the mountain front, a confined aquifer below much of the valley floor and a shallow unconfined aquifer above the confined aquifer. While all of these aquifers are hydrologically connected, the deep unconfined and confined aquifers are generally referred to as the "principal aquifer." Near the mountains the valley fill aquifer system is replaced by bedrock aquifers formed from the indurated bedrock units exposed in these areas.

As discussed in detail in Dames & Moore (May 1988), the principal aquifer underlying the landfill includes the semi-consolidated sediments (located immediately above the claystone and mudstone) as well as the upper Quaternary deposits of clay, silt, sand, and gravel. These two geologic units were included in the definition of the principal aquifer because they are permeable, interconnected and are a significant part of the flow system within the aquifer. The underlying Tertiary Age claystone and mudstone unit is, in contrast, considered to be relatively impermeable and the flow of ground water within or below this unit is not considered to be significant to flow occurring within the principal aquifer. The elevation of the top of the claystone unit is considered to be the elevation of the base of the principal aquifer.

Because there are no distinct impermeable beds confining the principal aquifer under TJL, the top of the aquifer is taken to be the water table. The depth to water in well #1 is about 306 feet from ground surface. Consequently, there is no shallow aquifer present at the landfill site, only the deep principal aquifer. Appendix I – Well Data shows the relative location of the TJL, KUC, and methane wells.

Hydraulic properties such as transmissivity, permeability and storage coefficients and or specific yield of the aquifers in the study area have been estimated from aquifer tests, specific capacity tests, results of previous modeling efforts and the physical characteristics of the hydrologic units comprising the aquifer.

Aquifer tests were conducted within 1,400 and 3,700 feet down gradient of TJL at wells K60 and K109, respectively (KUC's old production wells). These two wells are screened in the deep fanglomerate deposits (430 to 645 feet and 403 to 540 feet, respectively), that were reworked by Bingham Creek subsequent to their original deposition. The transmissivity of the aquifer at both of these wells is high; around 2.4 x 10⁴ ft²/day with horizontal and vertical hydraulic conductivities of about 2.0 ft/day and 0.2 ft/day, respectively. Appendix I – Well Data shows the relative location of the KUC wells with regard to the landfill facility structures.

Since observation wells were not available for most of the pump tests in this area, storage coefficients were computed based on barometric well efficiency. A storage coefficient and or specific yield representative of the Bingham Creek alluvium and underlying fanglomerate at the landfill site is about 0.15.

In summary, the hydraulic properties of the shallow saturated Bingham Creek alluvium include fairly high horizontal and vertical permeabilities of about 200 ft/day. For the deeper semi-consolidated deposits where the water table is encountered, the horizontal and vertical permeabilities are much lower, about 2 ft/day and 0.2 ft/day, respectively, due to silts and clays. Unsaturated hydraulic conductivities would be several orders of magnitude lower than these, (EPA, July 1986).

1.3.2 Depth to Groundwater

Ground water levels were obtained from measurements taken over time in the wells constructed to monitor groundwater at the site, measurements reported in USGS publications and water level measurements taken by Kennecott in groundwater monitoring wells near the landfill as part of their ground water monitoring program.

Historically, water levels were at relatively low levels in the mid to late 1930's and in the early to mid 1960's, and at relatively high levels in the 1950's and in the mid1980's. Although few records are available, it appears that water levels were also at an apparent low around the turn of the century. Causes for these highs and lows in the water level appear to correspond generally to annual rates of precipitation.

The correlation of precipitation with water level changes is particularly apparent in water level data collected through the mid 1980's. The early 1980's data generally reflect a historic high in precipitation rates. Wells located away from major pumping centers showed significant rises in water levels in the mid 1980's, presumably as a result of increases in annual precipitation rates. Similarly, during periods of relatively low rates of precipitation such as during the mid 1930's and again in the early 1960's, water levels appeared at or near their lowest levels.

Ground water levels in Bingham Creek Drainage have been modified and impacted by construction and operation of the Bingham Canyon Reservoir and a KUC installed groundwater cut-off wall across this creek. Time graphs of water levels in the monitor wells (K100-K120, K84, K85, and K26) located below the Bingham Reservoir illustrate the rapid and pronounced effects of the operation of the reservoir on the water levels in these wells.

An upward vertical hydraulic gradient has been measured in four sets of nested monitor wells along Bingham Creek near the landfill. These include wells P190 A and B, P191 A and B, P213 B and C and P196 A and B in which the vertical water level elevation differences have measured about 3 feet, 1 foot, 29 feet and 100 feet, respectively. Wells which show such vertical gradients appear to reflect local inhomogeneities in the aquifer or a relatively close source of recharge. Most of the paired wells with one or more of the wells screened in the semi-consolidated or cemented deposits which form much of the deep unconfined areas of the principal aquifer do not show significant vertical gradients.

Wells P196 B and P213 C and well P208 B (KUC wells located in the near vicinity of Bingham Creek and the landfill), may be completed in a deep sediment-filled erosional channel. This channel is located above the claystone and mudstone unit which forms the base of the principal aquifer. The upward gradients observed in this area may be the result of the contrasting hydrologic properties of these channel materials coupled with high horizontal gradients and the upward discharge of ground water from the bedrock aquifers.

As mentioned, an east-west trending channel-like depression is present along Bingham Creek. It appears to have resulted from creek deposition of coarser-grained sediments and the winnowing out of fine-grained material from mudflow deposits by these creeks. This has resulted in increased permeability of sediments in these areas.

The most recent groundwater measurement data was taken from the wells on the landfill property in December of 2003. The monitor wells at TJL are labeled as TJMW-1 thru TJMW-5 as indicated on the well location map in Appendix I were installed between March of 1994 to July of 1998.

Groundwater elevations in the five monitoring wells have been decreasing rapidly over the past few years. Wells TJMW-2, TJMW-3, TJMW-4, and TJMW-5 have dried up to the point that analytical samples can no longer be taken. It is suspected that an up gradient groundwater cutoff wall completed by Kennecott Utah Corporation (KUC), several years of below average precipitation, and down gradient water usage all have contributed to the drop in water levels.

It should also be noted that KUC will begin an extensive groundwater recovery/remediation program immediately adjacent to TJL. This process will have an even greater impact to the groundwater elevations at the site.

A summary of the change in groundwater elevation and KUC's ground water recovery efforts can be found in Appendix C – Modified Corrective Action Plan.

1.3.3 Groundwater Flow and Direction

Historically, the lateral (horizontal) hydraulic gradient across the landfill has been about 0.03 foot/foot. Immediately up gradient and to the west toward the Oquirrhs, the lateral hydraulic gradient increases to about 0.08 foot/foot and conversely immediately down gradient, it decreases to about 0.01 foot/foot. All of these hydraulic gradients are relatively high in comparison to the lateral hydraulic gradients in other parts of the Salt Lake Valley. For example, the hydraulic gradient decreases to 0.004 foot/foot near the Jordan River about 7 miles directly east of the landfill.

The lower horizontal gradients east of the Oquirrh Mountains and east and down gradient from the landfill are believed to result from the transition from the lower permeability of the semi-consolidated fanglomerate deposits near the Oquirrh Mountains to the somewhat higher permeabilities of the unconsolidated deposits found further east.

The USGS (Hely and others, 1971) estimated a recharge rate to the ground water in the Jordan Valley of about 60,000 acre-feet/year or about 2.3 inches per year. The USGS, (1987) calculated the average rate of ground water movement in the area between wells K87 (located in the central part of the landfill) and well P197 A (down gradient and off-site from the landfill to the east-northeast about 3,600 feet from well K-87) to be about 260 to 920 feet per year, with travel times between 3.9 and 113.5 years.

Based on the groundwater elevations observed in the wells installed at the landfill and the KUC wells in the area around the landfill the general groundwater gradient has historically been predominantly eastward. However, as discussed previously, based on the elevations taken in the wells over the last few years, the direction of the groundwater flow has changed from generally east to generally south. It was also stated previously that KUC will begin an extensive groundwater recovery/remediation program immediately adjacent to the landfill. Appendix C — Modified Corrective Action Plan details the anticipated impacts to the ground water regime under the landfill.

1.4 ON-SITE WELLS

TJL has historically had one up gradient and three down gradient monitoring wells on the property that have been utilized for groundwater monitoring and sampling. The up gradient well was identified as TJMW-2 while the down gradient wells are TJMW-3, TJMW-4 and TJMW-5. These sampling wells were originally positioned based on the predominant groundwater flow being west to east. TJMW-1 was originally installed in March of 1994 as an up gradient well but was not used for groundwater sampling due to the presence of perched water that was not representative of the low pH groundwater documented to be present near the site. However, groundwater elevations are measured in TJMW-1 quarterly.

Monitoring Well TJMW-2 was completed to a depth of 455 feet below ground surface (Elevation 4814.16) and was drilled and completed in January 1995. The well served as the up gradient monitoring well. Monitoring well TJMW-3 was completed to a depth of 319 feet below ground surface (Elevation 4710.77) and was drilled and completed in December of 1995 as a down gradient well. Monitoring well TJMW-4 was completed to a depth of 365 feet below ground surface and was drilled and completed in November of 1997 as a down gradient well. Monitoring well TJMW-5 was completed to a depth of 365 feet below ground surface (Elevation 4705.9) and was drilled and completed in July of 1998 as a down gradient well.

Of all the monitoring wells installed at TJL, only TJMW-1 has measurable water within the well. All of the other wells are now dry. The locations of the TJL monitoring wells are included in Appendix I – Well Data.

1.5 WATER RIGHTS

A search of the Utah Division of Water Rights database indicates three (permitted wells) and no points of surface water diversion constituting a surface water right are within 2,000 feet of the facility boundary. The wells are all associated with KUC. Based on the records, the well locations are each listed twice, once as "Municipal" and then again as "Other". Locations 0 and 2 also have the same water right number. The water right output information is included in Appendix J – Water Rights.

1.6 SURFACE WATER

Bingham Creek is the only surface water that exists within one mile from the site perimeter. An historic drainage is indicated on the USGS Lark 7.5 minute quadrangle, 1952, photo-revised 1969, 1975, but that drainage has since been disrupted. Surface waters as defined by the United States Army Corp of Engineers is any body of water shown in blue or as a solid blue or dashed blue line on USGS maps. Appendix A – Drawings include the latest USGS 7.5 minute quad map.

Bingham Creek channel parallels the north property boundary of TJL. Currently most of the historic surface water of the Bingham Creek drainage is intercepted by a KUC operated pond across the Bingham Creek channel. The impoundment is located approximately one mile upstream of the landfill and is operated by KUC. Presently, any surface water drainage to Bingham Creek in the vicinity of the landfill is minimal, due to the small drainage area, and is directed to an on-site detention basin and primarily evaporates. An aqueduct is also identified on the map, however, this feature is no longer used and in all areas within the one mile radius, no longer exists. To the southwest of the landfill property boundary an intermittent stream feature runs approximately 7000

feet to the east-southeast draining into a depression to the south of the landfill. This depression (Bastian sink) is now cutoff from surface water flows by an access road.

The other surface water features in the vicinity of the landfill and outside the one mile radius consist of two tailings ponds to the west, upstream of the landfill, and Barneys Wash to the northwest, an intermittent stream that eventually drains to the Jordan River.

1.7 WATER QUALITY

1.7.1 Historic Ground Water Quality

Ground water quality within the study area ranges from drinking water quality in wells over one mile away to the north, northwest and north-northeast, to waters containing elevated TDS and low pH both upgradient and beneath the landfill. Previous work has delineated a 10,000 mg/l TDS contour line running beneath the landfill. The wide range in TDS concentrations in the study area reflects the impact of historic mining operations on the ground water. The ground waters at and surrounding the landfill are calcium chloride and calcium sulfate type ground waters.

Ground water quality in the area typically improves with depth since the sources of poor quality recharge are man-induced and typically enter the aquifer from the top. Improvement with depth also indicates a lack of strong vertical mixing. The slight upward vertical hydraulic gradient (observed at a few wells) may also help to limit the downward movement of contaminants.

In 1972, chloride concentrations peaked in wells located both up and down gradient from the landfill. Specifically, the up gradient wells include K26, K87 and K100, and the down gradient wells include P190 B and K60. Most of these wells also showed significant increases in sulfate levels and copper levels, particularly in the wells located immediately down gradient from the reservoir. Slightly elevated chloride levels (elevated compared to historic levels) were again observed in 1979 in wells up gradient from the landfill (K118, K120, P213 B and C) but only in one well down gradient from the landfill (P190 A). This data indicate that the elevated chloride, sulfate and copper levels were not due to landfilling activities at TJL. Low pH and high sulfate ground waters generally surround TJL. There currently are no exceptionally high levels of chloride detected in the ground waters down gradient from the landfill.

Seepage losses from historic operation of KUC's Bingham Canyon Reservoir up gradient from TJL (about 8,900 feet to the west) have been significant, estimated at about 1 to 7 million gallons per day since construction in 1965 (Dames & Moore, May 1988). The reservoir plume extends over 20,000 feet down gradient to the east, is about 10,000 feet wide, and encompasses the area under the landfill. The sulfate concentration in some of the monitor wells within the plume has historically

exceeded 50,000 mg/l with pH values less than 3.0. Based on the monitoring well located on Site, which were installed from 1994 to 1998, the sulfate concentration in well TJMW-2 has been around 5,000 to 6,000 mg/l and the sulfate concentrations in the remaining wells (TJMW-3, TJMW-4 and TJMW-5) have been around 1,500 to 2,000 mg/l. The pH results in these wells indicate well TJMW-2 with a pH around 3.0 to 4.0 and wells TJMW-3, TJMW-4 and TJMW-5 all around 6.0 to 7.0.

The vertical extent of the sulfate plume immediately east and down gradient of the reservoir (wells K84, K100 and K120) extends several hundred feet down from the top of the water table (which is only about 40 feet below ground surface near the reservoir due to reservoir seepage). Low permeability fine-grained sediments may have blocked further downward movement in this area. At well P279, located about 3,000 feet southeast of the reservoir, the sulfate plume is encountered at a depth of about 300 feet below the water table. Immediately down gradient from the landfill at well P277, (which was drilled and sampled to 1,200 feet), the sulfate plume also did not extend beyond a depth of about 200 feet below the water table.

1.7.2 Current Ground Water Quality

Since installation of the monitoring wells, tetrachloroethene, arsenic, and some other organic constituents have appeared in higher concentrations in the down gradient wells than the up gradient well. These constituents have recently appeared to be decreasing in concentration with time with the exception being tetrachloroethene.

Appendix C – Modified Corrective Action Plan summarizes the most recent ground water quality assessment at TJL with regard to the tetrachloroethene. Appendix K-2002 Ground Water summarizes the overall water quality of the water under TJL.

1.8 SITE WATER BALANCE

Among the possible problems created by waste storage in any landfill is the possible contamination of soil, surface water or groundwater by direct contact with the waste or by leached materials from water passing through the waste. Due to low precipitation and high evapotranspiration rates associated with the semi-arid climate in the Salt Lake Valley, the quantity of water infiltrating the landfill is predicted to be small and therefore the leachate generation low. The final landfill cover is designed to minimize infiltration and promote runoff. Furthermore, liquid waste is not allowed in the landfill. Estimates of leachate generation potential were also re-examined for the expanded landfill using the HELP (Hydrologic Evaluation of Landfill Performance) computer model. Two previous Dames & Moore studies have also examined ground water issues at the landfill.

The average annual precipitation for the TJL is approximately 15 inches. TJL maintains a weather station capable of measuring precipitation as well as temperature. Data from the weather station can be accessed via the following web address: http://www.met.utah.edu/cgi-bin/droman/meso base.cgi?stn=TRJO

1.8.1 Historic Water Balance Studies

In February 1989 Dames & Moore presented the results of preliminary hydrogeologic characterization at the landfill with recommendations for proposed leachate monitoring. In the spring of 1990 Dames & Moore implemented the leachate monitoring recommendations and conducted an investigation at TJL to assess the potential for landfill impacts on ground water quality. To determine quality and quantity of leachate generated, four boreholes were drilled and three suction lysimeters were installed in and immediately down gradient from the landfill. The lysimeters were sampled in the spring of 1990 following the seasonal period of maximum infiltration from winter snow melt and spring rains. Data on the subsurface water quality from lysimeters installed in October 1989 were presented in a Dames & Moore report in September 1990.

1.8.2 Storm Water Effects

Two storm water evaluations were performed to estimate the volumes of leachate produced from a 24-hour 25-year storm event (2.6 inches). Evaluations were performed on a typical landfill Cell to represent the conditions immediately following the construction of a new Cell (highest run-off potential) and the run-off conditions of a partially full Cell.

Run-off from the 24-hour 25-year storm event within a new cell would result from approximately 520,000 square feet of lined area and approximately 180,000 square feet of active landfill covered with daily/intermediate cover. This cover soil would provide some water storage capacity from available pore space and additionally the surface depressions created by landfill compactors. The depressions created by compacting the waste and cover soil will creates small surface impoundments that will retain much of the potential run-off from the storm event. In contrast virtually all of the precipitation that falls on the lined portion of the cell would run-off and will need to be retained.

The perimeter ditch on the north has been in place for several years. All run-off from closed areas of the landfill are directed to a storm water holding pond located at the northeast area of the landfill.

New Cell Run-Off Conditions

Based on this information, storm water runoff calculations for a 25-year 24-hour storm within a newly constructed Cell are as follows:

Lined Area:

Runoff volume:

2.6 inches of precipitation over 520,000 square feet

0.217 feet x 520,000 square feet = 112,840 cubic feet.

Active Landfill (soil with surface depressions):

Runoff volume:

Using 2.6-inches of precipitation, a curve number of 65, type II rainfall and a time of concentration of 30 minutes with the TR55 computer software, runoff is estimated to be 0.34 inches. The curve number 65, type II was selected to represent the surface conditions of the active landfill soil cover with the surface depressions. The associated runoff volumes are:

0.34 inches over 180,000 square feet

 $0.028 \times 180,000 \text{ square feet} = 5,100 \text{ cubic feet}.$

TOTAL VOLUME = 117,940 Cubic Feet

Storage capacity:

The leachate collection/evaporation pond is approximately 600' long 100' wide with a bottom slope of 2% in the east-west direction and 1% in the north south direction. The leachate collection/evaporation pond has a can retain approximately 60,000 cubic feet of liquid before migrating into the actual Cell footprint. The volume of the leachate collection/evaporation pond when the liquid is at the maximum pond level (12 inches of freeboard remaining on the eastern dike) is approximately 453,000 cubic feet.

Based on this analysis, the capacity of the storm water may temporarily rise onto the Cell bottom for a short duration if the 24-hour 25-year storm occurs immediately after the construction of a new Cell. However, all of the storm water will be contained in the lined areas of the landfill and not in MSW.

Partially Full Cell Run-Off Conditions

A second scenario (partially full) has been evaluated to represents the most typical condition of the landfill operation. Run-off from the 24-hour 25-year storm event within a half full cell would result from approximately 200,000 square feet of lined area and approximately 500,000 square feet soil cover with surface depressions:

Lined Area:

Runoff volume: 2.6 inches of precipitation over 200,000 square feet

0.217 feet x 200,000 square feet = 43,400 cubic feet.

Active Face (dimpled soil cover area):

Runoff volume: Using 2.6-inches of precipitation, a curve number of 65, type II

rainfall and a time of concentration of 30 minutes with the TR55 computer software, runoff is estimated to be 0.34 inches.

Therefore:

0.34 inches over 500,000 square feet

 $0.028 \times 500,000 \text{ square feet} = 14,000 \text{ cubic feet}.$

TOTAL VOLUME = 44,380 Cubic Feet

Storage Volume: Same as previous (approximately 60,000 cubic feet in the

leachate/collection pond bottom and 453,000 cubic feet total with

one-foot of freeboard).

Based on this analysis, the capacity of the leachate collection/evaporation pond will be sufficient to store the anticipated runoff without contacting any in place MSW when the Cell is half full. Should there be precipitation events that exceed the 24-hour 25-year storm event; the leachate collection/evaporation ponds ultimate capacity (with a 12 inch freeboard) is approximately 453,000 cubic feet. The ultimate capacity is reached when the leachate backs up to MSW on the western side of the pond.

The level of leachate in the detention basin will be continually monitored. If the depth of leachate in the detention basin approaches the 12 inch maximum depth criteria or comes in contact with the MSW, the leachate will be removed from the collection/evaporation pond and transported to either a Publicly Owned Treatment Works (POTW) or back onto the (Municipal Solid Waste) MSW in the lined cell.

1.8.3 Site Water Balance Conclusions

Based on the landfill design, the semi-arid climatic conditions (10 to 20 inches of rainfall per year), in-situ soil conditions, depth to ground water of over 300 feet, high pan evaporation rates and the operational constraint of no liquid waste disposal, significant leachate generation from the lined Cells of TJL and its impacts to underlying ground water is considered to be minimal. It should also be noted that the background quality of the groundwater in the area of the unlined and lined landfill is poor, as previously discussed.

Appendix L – Run-Off Data presents computations pertaining to storm water management.

SECTION 2 - ENGINEERING REPORT

2.1 LOCATION STANDARDS - EXISTING AND PROPOSED LANDFILL EXPANSION

The following sections present the Solid Waste Facility Locations Standards and discuss the status of TJL's compliance with those requirements.

2.1.1 Land Use Compatibility

The UDEQ Division of Solid and Hazardous Waste's Solid Waste Permitting and Management Rules state that no Class I, Class II or Class V landfill will be located within:

- One thousand feet of a national, state or county park, monument, or recreation area; designated wilderness or wilderness study area; or wild and scenic river area.
- Ecologically and scientifically significant natural areas, including wildlife management areas and habitat for listed or proposed endangered species, as designated pursuant to the Endangered Species Act of 1982.
- Farmland classified or evaluated as prime, unique, or of statewide importance by the U.S. Department of Agriculture, Soil Conservation Service, under the Prime Farmland Protection Act.
- One-quarter mile of existing permanent dwellings, residential areas, and other incompatible structures, such as, schools, churches, and historic structures or properties listed or eligible to be listed in the State or National Register of Historic Places.
- Proximity to an airport.
- Areas with respect to archeological sites.

2.1.1.1 Trans-Jordan Landfill Status

- The Trans-Jordan Landfill is not located within 1,000 feet of a national, state, or county park, monument, or recreation area; designated wilderness or wilderness study area; or wild and scenic river area.
- Ecologically or scientifically significant natural areas have not been observed within
 or adjacent to the current site. This site is an active landfill and has been used as such
 since the late 1950s.
- There are not soils within the landfill property boundaries that are classified prime soil types for farmland use according to the Soil Conservation Service (SCS) maps of Salt Lake County. Therefore, the site is not considered within a unique or important farmland zone.
- There are no schools, churches, historic structures, or properties eligible to be listed in the State or National Register of Historic Places currently located within one-quarter mile of the property line that encloses the area currently being operated as a landfill.

- The Landfill is not located within 10,000 feet of a public-use airport runway used by turbojet aircraft. Salt Lake Municipal Airport #2 is located approximately 5 miles north east of the landfill.
- No archaeologically significant discoveries have been made at the site, nor are any known to exist.

2.1.2 Geologic Hazards and Geotechnical Engineering

The Utah State Regulations indicate "No new facility or lateral expansion of an existing facility shall be located in a subsidence area, a dam failure flood area, above an underground mine, above a salt dome, above a salt bed, or on or adjacent to geologic features which could compromise the structural integrity of the facility."

Neither the unlined landfill nor the lined landfill cells areas are located in a subsidence area, a dam failure flood area, above an underground mine, above a salt dome, or above a salt bed as mentioned in the Utah State Regulations. However, the landfill area is located in the southwest portion of the Salt Lake Basin along the eastern side of the Oquirrh Mountains. Geologic hazards such as debris flows, alluvial fan flooding, liquefaction and faulting can be a potential concern in this area and were therefore assessed.

2.1.2.1 Debris Flows and Alluvial Fan Flooding

Based on the distance from the mountain front and the topography and elevations of the site, the hazard from debris flow and alluvial fan flooding is considered very low and should not be considered a concern.

2.1.2.2 Liquefaction

Certain areas within the Intermountain Region also possess a potential for liquefaction during seismic events. Liquefaction is a phenomenon whereby loose, saturated, granular soil deposits lose a significant portion of their shear strength due to excess pore water pressure buildup resulting from dynamic loading, such as that caused by an earthquake. Among other effects, liquefaction can result in densification of such deposits causing settlements of overlying layers after an earthquake as excess pore water pressures are dissipated. The primary factors affecting liquefaction potential of a soil deposit are: (1) level and duration of seismic ground motions; (2) soil type and consistency; and (3) depth to groundwater.

Referring to the "Surface Fault Rupture and Liquefaction Potential Special Study Areas" map dated March 31, 1989 and published by Salt Lake County Public Works - Planning Division, the subject site is located within an area designated as "very low" for liquefaction potential. Based on the field

data, it is our opinion that the soil deposits at the site generally have a very low potential for liquefaction and should not be considered a concern for this site.

2.1.2.3 Seismicity and Faulting

Review of the "Surface Fault Rupture and Liquefaction Potential Special Study Areas" map dated March 31, 1989 and published by Salt Lake County Public Works - Planning Division, indicated there are no known active faults that pass under or immediately adjacent to the site. The site is located approximately 13 miles west of the Cottonwood section of the Salt Lake City segment of the Wasatch fault zone (Personius and Scott, 1992; Hecker, 1993). The Cottonwood section is one of three major splays of the Salt Lake City segment. The site is also located 12 miles northwest of the northern end of the Provo segment of the Wasatch fault. The Provo segment is 70 km long and is one of the longest segments of the Wasatch fault zone. The Traverse Mountains mark the northern extent of the Provo segment and form a structural boundary between the Salt Lake City and Provo segments of the Wasatch fault zone. The site is also located approximately 8.4 miles east of the Oquirrh fault zone. The Oquirrh fault zone, where it is exposed, consists of a single fault strand, which extends for 19 miles along the western side of the north Oquirrh Mountains (Lund, 1996). The site is also located approximately 8.5 miles southwest of the West Valley fault zone. The West Valley fault zone trends in a north - south orientation and is located in the central portion of the Salt Lake valley (Keaton and Curry, 1993). While the West Valley fault zone is reported to be active and probably seismically independent of the Wasatch fault zone, sympathetic movement on the West Valley fault zone resulting from major earthquakes on the Wasatch fault zone is a possibility. Analyses of ground shaking hazard along the Wasatch Front suggests that the Wasatch fault zone is the single greatest contributor to the seismic hazard in the Salt Lake City region. However, due to its close proximity to the site, the West Valley fault zone should be considered a large contributor to the seismic hazard at the site.

The expected maximum ground acceleration from a large earthquake at this site with a two (2) percent probability of exceedance in 50 years is 0.41g (United States Geologic Survey's (USGS) Earthquake Hazards Program - National Seismic Hazard Mapping Project). These values are estimated ground surface accelerations for a "firm rock" site, which is identified as having a shear-wave velocity of 760 m/sec in the top 30 meters. Sites with different soil types may experience amplification or de-amplification of these values. The site is situated within the International Building Code (IBC) Region 2. Based on our field investigation, it is our opinion the soils at this site are representative of a "very dense soil" profile having an average shear wave velocity $1,200 \le \bar{\nu}_S \le 2,500$ (ft/sec) in the top 100 feet, best represented by IBC Site Class C having Site Coefficients of F_a = 1.0 and F_v =1.45. The following table reports the ground motion from the values obtained from the USGS website for the subject site.

LOCATION 40.5	5572° Latitude -112.05° Longitude		e
Distance to nearest g	rid point	6.36 kilometers	
Nearest grid point	40.6° Latit	ide -112.1° Longitude	
Probabilistic ground motion values at the nearest grid point are:	10% Probability of Exceedance in 50 Years (% gravity)	5% Probability of Exceedance in 50 Years (% gravity)	2% Probability of Exceedance in 50 Years (% gravity)
PGA	20.64	28.62	41.27
0.2 sec SA	48.94	68.37	112.01
1.0 sec SA	15.69	23.68	35.63

2.1.2.4 Seismic Impact Zone

The EPA and the DSHW define a seismic impact zone as any location with a 10% or greater probability that the maximum horizontal acceleration (MHA) in lithified earth material, expressed as a percentage of the earth's gravitational pull, will exceed 0.10g in 250 years. Dames & Moore, 1998 indicated there was a 10 percent chance in 250 years that the area could experience horizontal accelerations of 0.40g to 0.60g, and used 0.50g in their analysis. As mentioned previously, updated mapping by USGS Earthquake Hazards Program – National Seismic Hazard Mapping Project indicates the predicted Maximum Horizontal Acceleration (MHA) at the site is 0.41g. Therefore, the site does lie within a Seismic Impact Zone.

The MHA in lithified earth material is defined in 40 CFR part 258.14 (EPA 1991) as the "maximum expected horizontal acceleration depicted on a seismic hazard map with a 90% or greater probability that the acceleration will not be exceeded in 250 years, or the maximum expected horizontal acceleration based on site specific seismic risk assessment." This definition was adopted in full by the UDEQ. The acceleration value of approximately 0.41g was obtained from the United States Geologic Survey's (USGS) Earthquake Hazards Program – National Seismic Hazard Mapping Project. The value is an estimated ground surface acceleration of a "firm rock" site, which is identified as having a shear-wave velocity of 760 m/sec in the top 30 meters; sites with different soil types may amplify or de-amplify this value. Section 2.1.2.5 discusses the analyses performed for this permit application and makes reference those performed by others.

2.1.2.5 Seismic Impact Zone Analysis

A seismic response analysis and a dynamic deformation analysis were performed by Dames & Moore, 1998. IGES performed a review of this seismic study and felt additional analysis should be performed based on the more recent and updated data available pertaining to the updated MHA information discussed previously and other updated information pertaining to the properties of the waste, soil and geosynthetic materials.

Cross-sections of the bottom excavation and final cover were generated and used in modeling static and seismic stability. The most critical sections of the bottom excavation and final cover were modeled. The excavation for Cell 5 had the deepest cut and the final cover slope in Phase H had the longest cover slope. Side-slope cuts of 3 horizontal to 1 vertical and final cover slopes of 4 horizontal to 1 vertical are planned. These sections are presented in Appendix M – Slope Stability.

Three material types were used for the stability analyses: foundation (in situ) soil, municipal solid waste (MSW), and cover interface (low strength zone in the cover). The following table presents the strength and unit weight parameters used for in the stability analyses:

Property	Property Native Soils		MSW		
Unit Weight (pcf)	125	130	63, 66, 70, 74, 80		
Cohesion (psf)	0	100	0		
Internal Friction Angle (deg.)	36	38	33		

Foundation soil strength and unit weight parameters were assigned based upon field sampling and laboratory testing completed by Dames & Moore. An effective friction angle of 36 degrees, a cohesion of zero, and a total/saturated unit weight of 125 pounds per cubic foot were used for foundation soils in the analyses.

Municipal solid waste strength and unit weight parameters were estimated based upon historical data (Kavazanjian, et. al., 1995). Although strength parameters were assumed constant with depth, unit weight was assumed to increase with confining pressure (depth) as recommended by Kavazanjian et. al, 1995. The critical final cover cross section was separated into five MSW layers with total unit weights ranging from 63 to 80 pounds per cubic foot.

The unit weights used in the stability analysis are different than those used to compute the capacity of the landfill and incorporate the effects of mixing the MSW with soil and consolidation which will occur over time. The consolidation of the landfill material results in a decrease in void ratio resulting in a larger unit weight which increases with depth. The unit weight at the top of the landfill would represent MSW (48 pcf) mixed with approximately 15 to 20% soil with a unit weight ranging from 120 to 130 pcf. (i.e. 48 pcf + 15% of 125 pcf = 67 pcf) The values used in the slope stability analysis are also based on historical data (Kavazanjian, et. Al., 1995) for consolidated MSW.

The internal friction angle of the reinforced GCL liner and the interface friction angle of the GCL to the textured polyethylene liner were also analyzed. Test results pertaining to both of these parameters for the Bentomat ST product have been compiled. This information is summarized below:

Shear Strength Data of Bentomat ST as a Function of Overburden*

Overburden Stress (psf)	Internal Friction Angle (degrees)	Cohesion (psf)
<3000	34.9	280
>3000	24.5	450

^{*} These values are an average of direct shear test data on hydrated bentonite.

Interface Shear Strength Data of Bentomat ST against a Textured Polyethylene Liner as a Function of Overburden*

Overburden Stress (psf)	Internal Friction Angle (degrees)	Cohesion (psf)
<1200	29.5	25
>1200	17.6	200

^{*} These values are an average of direct shear test data on hydrated bentonite.

Static and pseudo-static analyses of the slope sections were performed using critical sections of the landfill geometry and the soil, geosynthetic and waste parameters outlined previously. Results are presented in Appendix M – Slope Stability. The static and pseudo-static slope stability analyses were completed using the computer program GSTABL7.

In order to estimate the potential amplification of the bedrock or "firm rock" acceleration of 0.41g as it travels up to the surface and then to the top of the Landfill, the simplified approach developed by GeoSyntec (1994) was used. This method uses information from Sing and Sun (1995) and Kavazanjian and Matasovic (1995) in a three step procedure to estimate the potential amplification. The three step procedure is outlined as follows:1) classify the soils in the top 100 feet; 2) estimate the free field peak ground surface acceleration; and 3) estimate the peak acceleration at the top of the landfill.

Based on the soil profile at TJL the upper 100 feet of material classifies as a medium stiff to stiff site (stiff to very dense soil according to IBC 2000). Therefore, the free field peak ground surface acceleration is assumed to be approximately equal to the peak bedrock acceleration and the maximum horizontal acceleration (MHA) at the ground surface is considered to be 0.41g using the analytical data from Kavazanjian and Matasovic (1994). Based on this information and an approximate fill height of 200 feet, the peak acceleration at the top of the Landfill was estimated

to be 0.53g using the analytical data from and Singh and Sun (1995). Appropriately, an average acceleration of 0.47g was used in the stability and deformation analysis performed for the waste mass (Repetto et al., 1993).

The peak ground acceleration (free field peak acceleration) for the site was found to be 0.41g. This value may attenuate as the motion travels to the top of the fill (approximately 200 ft) to approximately 0.53g near the top of the landfill, as shown by Sing and Sun (1995), resulting in an average acceleration across the landfill embankment of 0.47g. Stability analysis was performed using ½ the maximum acceleration rather than the average acceleration of the embankment as stated in Section 2. However, the ratio of the yield acceleration using either the average or maximum acceleration indicated satisfactory performance (anticipated deformations less than one-foot; ratio larger than 0.5) of the landfill as shown in the table below.

Section	Yield Acceleration (Ky)	Acceleration at top of landfill (amax)	Average acceleration through landfill (aavg)	Ky/amax	Ky/aavg
Cell 5	0.34g	0.53g	0.47g	0.64	0.72
Phase H	0.36g	0.53g	0.47g	0.68	0.77

Hynes and Franklin (1984) performed several Newmark seismic deformation analyses on embankments using 387 strong motion records and 6 artificial accelerograms. The analyses performed considered the yield accelerations (minimum acceleration to cause failure) of the slope sections evaluated by pseudo-static methods and compared them to the anticipated horizontal embankment accelerations. Based on these analyses performed by Hynes and Franklin, deformations are anticipated to be one foot or less if the yield acceleration is greater than or equal to one-half the horizontal acceleration of the waste mass. Therefore, using a horizontal acceleration of 0.27g to obtain a pseudo-static factor of safety of 1.0 or greater indicates satisfactory performance of the waste mass under seismic conditions (deformation less than 1 foot).

A summary of the static and seismic (pseudo-static and deformation) analyses is presented below. Slope stability runs of the static and dynamic analysis are provided in Appendix M – Slope Stability.

Section	Static Factor of Safety	Pseudo-Static Factor of Safety	Yield Acceleration	Deformation (feet)
A (Cell 5	2.26	1.14	0.34g	<1
Excavation)				
B (Phase H	2.65	1.19	0.36g	<1
Final Cover)				

Typical allowable limits in stability analyses are; a minimum factor of safety of 1.5 during static conditions, a minimum factor of safety of 1.0 during pseudo-static (seismic) conditions, and a maximum allowable deformation of 1 foot. Based on the results of the analyses performed using the planned geometry of the landfill with 3H:1V excavation slopes in the bottom of the landfill and 4H:1V slopes in the final cover, the stability of the slopes are above the minimum standards.

2.1.2.6 Unstable Areas

An unstable area means "a location that is susceptible to natural or human induced events or forces capable of impairing the integrity of some or all of the landfill structural components responsible for preventing releases from a facility". Unstable areas include poor foundation conditions or karst terrain resulting in excessive differential settlement, or areas susceptible to mass movement liquefaction.

The site is located on dense, alluvial deposits that are not susceptible to mass movement or liquefaction. Site borings indicate dense soils extend for sufficient depths such that excessive settlement of foundation soils will not occur. The Bingham Creek drainage is adjacent to the site, however, any surface water flows will not encounter planned expansions. The site is not located within a public watershed and no water retention facilities are located within a reasonable distance down gradient from the site.

2.1.3 Surface Water Requirements

UDEQ has adopted Subtitle D location restrictions for floodplains, and watersheds. The landfill site does not currently fall within a delineated 100-year flood zone. The proposed expansion is not located in a watershed for a public water system or a location that could cause contamination of a lake, reservoir, or pond. There are no known endangered or threatened species within the landfill area.

2.1.3.1 Floodplain

The existing landfill is located adjacent to the 100-year floodplain of the Bingham Creek channel. The creek is dry year round because of upstream watershed management performed by KUC. The facility, including all of the future cell construction will not reduce or restrict the Bingham Creek drainage. The lined landfill area consists of the gently sloping (approximately

2%) eastward drainage plane located along the site's south boundary and bounded on the north by the unlined landfill.

Work related to contaminated soil removal in the Bingham Creek channel was completed by ARCO (west of the landfill) and KUC (north and east) in early 1996. As a result of the remediation work, the former channel was excavated and reconstructed using a uniform trapezoidal section. Flood routing analysis was performed for the reconstructed channel section and shows that for the 100-year, 24-hour flood, Bingham Creek flows would not inundate adjoining portions of either the unlined or lined landfill cells. Appendix N – Bingham Creek Flow Model presents the analysis of the flood routing of Bingham Creek.

2.1.4 Wetlands

No new facility or lateral expansion of an existing facility shall be located in wetlands unless the owner or operator demonstrates to the Executive Secretary that:

- Where applicable under section 404 of the Clean Water Act or applicable state wetlands laws, the presumption that a practicable alternative to the proposed landfill is available which does not involve wetlands is clearly rebutted;
- The unit will not violate any applicable state water quality standard or Section 307 of the Clean Water Act
- The unit will not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of a critical habitat protected under the Endangered Species Act of 1973.
- The unit will not cause or contribute to significant degradation of wetlands. The owner or operator must demonstrate the integrity of the unit and its ability to protect ecological resources.

2.1.4.1 Trans-Jordan Landfill Status

There are no known or designated wetlands within the limits of the landfill boundary.

2.1.5 Groundwater Requirements

UDEQ location restrictions with respect to groundwater protection include the following:

- No new facility shall be located at a site where the bottom of the lowest liner is less than 5 feet above historical high level of groundwater in the uppermost aquifer.
- No new facility shall be located over a sole source aquifer as designated in 40 CFR 149.

- No new facility shall be located over groundwater classified as IB under Section R317-6-3.3 (an irreplaceable aquifer).
- A new facility located above any aquifer containing groundwater which has a total dissolved solids (TDSs) content below 1,000 milligrams per liter (mg/l) and does not exceed applicable groundwater quality standards for any contaminant is permitted only where the depth to groundwater is greater than 100 feet. For a TDS content between 1,000 and 3,000 mg/l, the separation must be 50 feet or greater. These separation distance requirements are waived if the landfill is constructed with a composite liner.
- No new facility shall be located in designated drinking water source protection areas
 or, if no such protection area is designated, within a distance to existing drinking
 water wells or springs for public water supplies of 250-day groundwater travel time.

2.1.5.1 Trans-Jordan Landfill Status

The lowest point of the bottom of the proposed landfill expansion is at least 250 feet above the highest observed groundwater elevation noted in the monitoring wells on and surrounding the site. The bottom liner will be the equivalent of a composite system, using a GCL overlain by a 60-mil HDPE membrane. Groundwater beneath the landfill area is not classified as a sole source or Class IB (irreplaceable aquifer). A groundwater transport study was not conducted as part of this investigation. Based on this information the proposed expansion does meet the requirements of the groundwater protection location restrictions.

2.2 PHASED DESIGN - PROPOSED LANDFILL DEVELOPEMENT

This permit application includes provisions for expanding the existing operation onto TJL controlled land immediately adjacent to the currently operating landfill area. This expansion consists of the development of Cells 4, 5, and 6. The following sections discuss the development of future cells and the incremental filling of the landfill Phases.

2.2.1 Estimated Life

The projected waste stream for TJL will comes from the member cities, KUC, and other southern valley non-member municipalities. Estimated daily waste tons being delivered to the TJL operations is approximately 1,000 tons based on recent records. Only limited distinction is made in the records between residential and commercial waste disposal. A recently implemented green waste bypass program operated in conjunction with the adjacent South Valley Water Reclamation Facility (SVWRF), coupled with recycling programs to be expanded by the member cities will, to a limited extent, offset the population growth in the area. The anticipated future air space consumption has been evaluated based upon a 2% waste stream increase.

All volume calculations were made using Autodesk Civil Design software earthwork package integrated into AutoCAD. Elevations for the ground surface were initially obtained by conventional aerial surveying methods and have been periodically updated using Global Positioning System (G.P.S.) survey methods. As earthwork and ongoing landfilling continues at the site, G.P.S. data will be used to update the base topographic map.

Volume calculations were based on the following assumptions. The quantity of municipal solid waste (MSW) weighed across the scale was approximately 307,000 tons in 2003. At a ratio of 1,300 pounds per cubic yard and a 20% incorporation of cover soils into the waste, the consumption of air space in 2003 was approximately 567,000 cubic yards. The life of the TJL facility; with the annual 2% increase in tonnage, is approximately 25 years. Appendix A – Drawings present the landfill life.

The landfill life projections are only estimates; the actual life of the landfill will depend on several variables including the actual rate of waste being delivered, densities, settlement and the potential use of alternate daily cover materials.

2.2.1.1 Remaining Phase B

TJL has brought Phase A to final elevations in anticipation of the construction of final cover in the summer of 2004. Phase B is the current operational area of TJL. Phase B has approximately 187,000 cubic yards of airspace remaining. The remaining airspace will provide landfilling capacity for approximately 5 months. Appendix A – Drawings indicate the location of the closure Phases.

2.2.1.2 Phase C

As Phase B nears completion; waste will be placed into the Phase C area. Due to the geometry of the final cover; it is necessary to partially develop the ensuing closure Phase to allow safe site access. Phase C has approximately 907,000 cubic yards of airspace remaining which will provide landfill capacity for approximately 21 months.

2.2.1.3 Phase D

The capacity of Phase D has approximately 2,500,000 cubic yards of airspace remaining providing approximately 53 months of service.

2.2.1.4 Phase E

The capacity of Phase E has approximately 3,200,000 cubic yards of airspace remaining providing approximately 65 months of service.

2.2.1.5 Phase F

The capacity of Phase F has approximately 2,300,000 cubic yards of airspace remaining providing approximately 45 months of service.

2.2.1.6 Phase G

The capacity of Phase G has approximately 2,700,000 cubic yards of airspace remaining providing approximately 55 months of service.

2.2.1.7 Phase H

The capacity of Phase H has approximately 3,500,000 cubic yards of airspace remaining providing approximately 62 months of service. The service life of Phase H is shorter than that of Phase E because of the 2% annual escalation of the waste stream.

2.3 CELL DESIGN

The design concept for the development of the future lined cells at TJL includes 3 more cells. The intent of the incremental development of the cells is to spread out the capital investments and minimize the area of the landfill that requires final cover.

The incremental expansion allows for the development of future cells while providing soil for daily landfill operations and final cover construction. The approximate location of the remaining lined landfill cells are shown on Drawing 4 (Lined/Unlined Landfill).

A fundamental landfill design consideration is to minimize the conditions which are conducive to the generation of leachate. The composite liner system utilized at TJL helps to minimize the potential for leachate to migrate from the bottom of the landfill. The design concept provides for the free drainage of water away from the working face in every cell during each phase of construction and operation. A final, composite sloping soil cover system covering the completed cells will minimize long term rainfall infiltration. Long-term monitoring will be implemented to observe subsidence, and surface ponding and in-turn, reduce the potential for leachate development.

Secondary design considerations include balancing soil cut, fill and stockpile requirements while maximizing the useable disposal space, current facility operational requirements, and long term facility operational concerns. All soils generated from the on-site activities and all soils existing in stockpile locations are required to be used for the operations TJL.

The final landfill cover will be seeded with drought resistant grasses and native vegetation as each of the cells are completed. The vegetative cover will minimize the water and wind erosion

while visually allowing the landfill, once closed, to unobtrusively blend into the surrounding topography.

2.3.1 Phased Construction

Waste is placed in the current landfill closure Phase while cover soils are excavated from the ensuing Cell. Waste is currently being placed in Phase B with the daily and intermediate cover soils coming from the excavation of Cell 4. Waste will continue to be placed in this manner from west to east. Sufficient soil will be stockpiled from the excavation of Cell 4, Cell 5 and Cell 6 to provide adequate daily, intermediate and final cover soils for closure Phase H.

2.3.2 Arrangement

Several factors influenced the geometry of the lined landfill cells. The primary objective was to cost effectively maximize the volume of the landfill while minimizing visual and operational impacts. The height and footprint of the landfill are a result of a balance of these concerns. The depth of the landfill has been modified to accommodate leachate and to provide for the operational cover soils required. Expansion west is limited by the Utah Highway 111. Northward expansion is limited by the Bingham Creek Channel and property boundaries. Expansion to the east and south is also limited by property boundaries. Vertical expansion has been limited by visual impact considerations of raising the landfill too far above the surrounding terrain. No additional lateral or vertical expansion is planned for the TJL facility.

The crest of the landfill intentionally varies from a straight line, and the west to east slope of the crest varies, to lessen the "man made" look. The cap will be constructed to maintain a minimum top slope of 3% for ease of construction but will have a greater maximum slope in most areas because the crest also slopes downward to the east. Around most of the landfill perimeter, a 4 horizontal to 1 vertical slope will extend downward from the final cap to the natural ground surface.

2.3.3 Liner

The landfill Cells are designed with environmental controls (both a composite liner and a leachate collection system) that are intended to protect surface water and groundwater from contamination. The previously approved composite liner system consists (from the bottom up) of:

- Prepared subgrade foundation
- A geosynthetic clay liner (GCL)
- A geomembrane liner (textured 60-mil HDPE)
- A geocomposite drainage layer (Drain-net)
- 12" screened soils
- 12" general site soils

6' select waste

This composite design will be modified in areas where a temporary Leachate collection/evaporation pond is located to be two layers of HDPE liner rather than one layer of GCL and one layer of HDPE. Any Leachate collection/evaporation pond that will be utilized as a permanent sump will be designed and constructed with a double liner system (a primary liner of GCL and HDPE installed over a secondary liner of GCL and HDPE).

The select waste layer is specified to be placed directly over the 24" of protective soil as an additional protective measure for the liner components. The select waste is composed of sideloader waste (small residential waste) which by its nature is less likely to contain materials that could damage the liner.

This configuration was selected to provide a composite liner system that closely resembles the standard synthetic-over-clay composite liner system required by State of Utah Regulations (R315-303-4). This alternative liner system has been previously approved for use at TJL by the DSHW.

The future landfill Cells (4, 5, and 6) will be excavated to the contours indicated on the Drawing 5 and Drawing 6 in Appendix A – Drawings. Design drawings, specifications, and QA/QC packages will be submitted to DSHW for review and approval prior to the construction of each Cell.

2.3.4 Fill Methods

TJL uses an area fill method. In the area fill method, an area is excavated and prepared as a lined landfill cell. During filling of each of the landfill phases, an adjacent area is excavated (for generation of cover soils) in preparation for the next lined cell such that the new cell is ready to receive waste as the previous phase is 50% full. The soils excavated during preparation of the new Cell are used as daily, intermediate, and final cover for the active landfill phase or placed in a soil stockpile for use in the future.

Once the liner system is installed, a 2-foot thick layer of protective soil is placed over the drain net (upper layer of the liner system) to protect the entire liner system. A 1-foot thick layer of soil will be placed on the side slopes incrementally as the waste depth increases. The first solid waste placed in a newly constructed landfill phase will be "select waste" placed in a layer approximately 6 feet thick. This material will also be placed as the first layer against the protective soil cover on the side slopes. Large objects will be removed from the deposited waste and the solid waste will be compacted as a single lift to provide an 8-foot-thick protective working surface over the liner and leachate collection systems. The Operation Plan (Part II, Section 3) details the criteria used and the select waste placement process in greater detail.

The filling of each of the lined cells will be accomplished in typically 250-foot wide, 17-foot deep and 8-foot high daily modules. The sequence will generally proceed west to east and north to south within the cells. A 6-inch thick soil layer (or approved alternate daily cover) will be placed over completed daily modules, isolating each day's waste placement within individual cells. The surface of the outside (eastern) face of the cell will be covered with a 12-inch thick compacted intermediate soil cover sloped to drain storm water away from the landfill modules and to prevent the ponding of precipitation over in-place waste. The actual geometry (height, width, and length) of the daily operating modules will vary daily due to the total tonnage of waste handled, number of vehicles requiring site access, and weather conditions.

2.3.5 Daily and Final Cover

2.3.5.1 Daily and Intermediate Soil Cover

Daily cover soils must meet the 6-inch State requirements for protection against odors, litter and vectors. The daily 6-inch thick cover will typically be obtained from the excavation of cells being developed for future disposal operations.

Intermediate cover soil requirements are governed by R315-303-4. The outside face of the daily modules and waste areas that are expected to remain inactive for more than 30 days will be protected with a 12-inch intermediate cover. The borrow area for intermediate cover soils is the same for daily cover soils. Based upon the nature of available soil at TJL crushing and screening of on-site soils is not required.

Before the start of waste placement each day, cover soils on top of the previous lift will be stripped back and stockpiled for reuse as soil cover at the end of the day or as needed. These recycled cove soils will be used first; the remainder of daily cover soils will be provided from cell excavation or stockpiled soils.

2.3.5.2 Alternate Daily Cover

TJL has not historically utilized alternate daily cover materials. Due to the nature of the landfilling operation; TJL proposes to utilize the following alternative daily cover materials as the need arises:

 Wood chips - The wood chips created from the grinding of green waste at the SVWRF site. As wood chips are produced from the grinding operations, some of the chips are utilized at the TJL facility for landscaping with the rest being sold to the public as part of the composting operation. Periodically, the timing of the compost process may result in the generation of excess wood chips. These wood chips may be utilized as an alternative daily cover to minimize the size of the wood chip stockpile.

2.3.5.3 Final Cover

TJL will initiate the placement of the final cover system within 180 days after the disposal ceases in each of the closure phases. Final cover construction will be completed within 180 days after initiation.

The final cover system is divided into two types of covers; a soil system – for the side slopes of the unlined landfill and a composite system – for the final cover in all other areas. The soil cover system on the side slope of the unlined landfill area consists of a minimum of five feet of site soils. As previously mentioned; the majority of the side slopes have already been covered with the 5-foot of soil. Test pits have been excavated on the side slopes to document that the minimum 5 foot depth of soil was achieved. The locations of the test pits excavated to date are presented in Appendix G.

TJL is scheduled to construct the composite final cover over the remaining area of the landfill in a series of 8 closure phases; Drawing 5 and Drawing 6 (Future Landfill Development) show the extent of each phase. The initial gas collection system will be constructed in conjunction with closure Phase A.

The composite final cover system will consist (from the bottom up) of:

- Minimum of 12-inches of intermediate cover soils
- Geosynthetic Clay Liner (GCL)
- 60-mil High Density Polyethylene (HDPE) Liner
- Geocomposite (drainage net sandwiched between unwoven geotextiles)
- 30-inches of protective cover soils
- 6-inches of vegetative cover soils

The composite final cover system will minimize surface water infiltration (thereby minimizing leachate generation), gas migration, maintain slope stability, control surface water and erosion, and be capable of supporting vegetative cover. The vegetative cover has been selected with shallow root systems to prevent penetration into the drainage layer or geocomposites. The vegetative cover system is described in detail in Part II Section 4.

The composite final cover design allows for natural watershedding during a normal rainfall or snowmelt with little infiltration into the drainage layer. However, in the case of a temporary low

spot created by landfill settlement or during periods of unusually high precipitation, water may infiltrate to the horizontal drainage layer. The geonet geocomposite drainage layer will transport the precipitation to the perimeter drain at the edge of the landfill. The perimeter drain will be connected to the stormwater run-off system beyond the final cover perimeter. Surface water runoff will be systematically routed to drop structures for conveyance to the perimeter ditches located outside the final cover.

The gas transmission layer will direct the MSW generated gases to the gas collector piping and ultimately to an end user for the methane or a site flare. The gas collection system will be designed and submitted to the DSHW for informational purposes prior to construction of gas collection system components.

The final cover will be constructed to the general contours as indicated on Drawing 7 (Final Cover) – Appendix A.

2.3.5.4 Elevations of Bottom Liner and Final Cover

As illustrated on the conceptual Drawings that are included with this permit application (Appendix A), the bottom liner has been designed to be installed at an elevation of between 5,080 and 4,980 feet above mean sea level (msl). The bottom elevation of each cell varies (lower) by several feet proceeding east to accommodate leachate flow. The final cover elevations are also presented on the conceptual drawings and vary between 5,040 and 5,250 feet.

2.4 MONITORING SYSTEM – LINED AND UNLINED LANDFILL

2.4.1 Groundwater Monitoring System

The groundwater monitoring system that has been monitored since March of 1994 is no longer functional. Four (4) of the five (5) wells have become dry – the Modified Corrective Action Plan in Appendix C summarizes the changes in the groundwater monitoring at TJL.

2.4.2 Leachate Collection and Treatment System

Among the possible problems created by waste storage in any landfill is the possible contamination of soil and surface or groundwater from water passing through the waste. Due to low precipitation and high evapotranspiration rates associated with the semi-arid climate in the Salt Lake Valley, the quantity of water infiltrating the landfill is predicted to be small and subsequent leachate generation low. The landfill cover is designed to minimize infiltration and promote runoff, and further, liquid waste is not allowed in the landfill.

What leachate is generated will be collected by the leachate collection system (LCS). The LCS consists of a geocomposite drainage material to provide lateral drainage of leachate directly above the liner system. The geocomposite will be placed over the entire bottom of the lined landfill cell. The grades and materials of the LCS will be designed to maintain functions during landfilling operations. The geocomposite is designed to limit leachate depths on the liner to less than one foot, even when clogged by sediments and biofouling that has been observed at other facilities.

The LCS, as designed, has been in operation within Cells 1, 2 and 3 of the lined landfill area. The design appears to function as intended and no operational problems have been experienced with the design to date. Future cell construction at TJL will incorporate leachate collection pipes to enhance the removal of leachate from the liner. Each leachate collection and header pipe will be oversized to allow for periodic maintenance cleaning.

The bottom of the future lined cells will be graded to provide a minimum slope of 2% from the highest point of the graded bottom to the lowest point (west to east). A temporary leachate collection/evaporation pond is designed to be located at the east end of each of the lined landfill cells. As design capacity is reached in each cell, these temporary ponds are abandoned and become part of the next cell. Eventually each cell interconnects and the leachate is transported to a permanent evaporation pond at the east end of the site. A permanent sump will be established in the lowest lined area of the landfill with the leachate being pumped to a permanent sump located over the lined landfill area.

2.4.3 Landfill Gas

The decomposition of solid waste produces methane, a potentially flammable gas. The accumulation of methane in site structures can result in fire and explosions that can injure employees and property, users of the landfill, and occupants of nearby structures. In accordance with Subtitle D and Utah rules, TJL will conduct subsurface and facility structure gas monitoring at least quarterly for methane detection. The concentration of methane gas generated by the landfill must not exceed 25% of the lower explosive limit (LEL) in the facility structures (excluding gas control or recovery system components). The concentration of methane gas generated by the landfill must not exceed the LEL at the facility boundary. As outlined in EPA Subtitle D, Subpart C and the State of Utah Regulations, TJL will take all necessary steps to protect human health and will immediately notify UDEQ of methane levels detected above required limits and actions taken, if any. Within 10 days of an incident, TJL will place documentation of the methane gas levels detected and a description of the interim steps taken to protect human health in the operating record. Within 60 days of detection, TJL personnel will implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify UDEQ that the plan has been

implemented. The remediation plan will describe the nature and extent of the problem and describe the proposed remedy.

The cover soils for the Trans Jordan Landfill site will be predominantly silty to clayey gravels and sands of sufficient porosity such that the small amount of methane which may be produced would typically exit through the cover. The inclusion of a 60 mil HDPE membrane in the final cap will tend to limit natural egress of these low volumes of gas. The gas transmission layer will direct the MSW generated gases to collector pipe for delivery to end users or a methane flare.

A copy of TJL's Title V Operating Permit is included as Appendix Q – Title V Operating Permit.

2.5 DESIGN AND LOCATION OF RUN-ON/RUN-OFF CONTROL SYSTEMS

The main objectives of surface water management for the landfill expansion are; to provide landfill drainage and to prevent off site run-on, preventing unnecessary surface water infiltration and subsequent leachate production; to contain surface runoff from open areas on-site; and to prevent erosion. Federal regulations require: 1) A run-on control system to prevent flow onto the active portion of the landfill during the peak discharge from a 24-hour, 25-year storm; and 2) Run-off control system from the active portion of the landfill to collect and to control at least the water volume resulting from a 24-hour, 25-year storm.

2.5.1 Run-On from a 24-Hour, 25-Year Storm

Due to the location of the TJL facility; there is no potential for run-on. TJL is located higher than the topography to the north, south and east with U-111 providing a drainage break to the west. The only surface water that will require some management is the small volume of storm water run-on that is generated from the site landscape berms.

2.5.2 Run-Off from a 24-Hour, 25-Year Storm

The 25-year, 24-hour storm potential precipitation is 2.52 inches based on information from the Utah Climate Center. This precipitation level was used to size the perimeter channels and detention pond. Also, the final cover will consist of a geomembrane underlying a drain net that will capture any infiltration and direct it into the channels to be managed as run-off. This additional potential flow was considered into the design of the channels and detention areas by increasing run-off values. Realistically, run-off through the drain net will only occur if the storage capacity of the cover soils are exceeded, which would be rare for this type of climate.

Run-off from the final cover will be directed by ditches along the perimeters of the landfill site into a detention basin at the northeast corner of the landfill. The ditches will begin at the west end of

the landfill with one ditch circling around the north end of the landfill and the other circling around the south. Using a curve number of 95, type II rainfall and a time of concentration of 42 minutes, with the TR55 computer software, peak flows were obtained for the perimeter drainage channels. A curve number of 95 was selected to represent a higher run-off an a more conservative design.

A value of 0.03 was used for Manning's coefficient of channel roughness, representative of a vegetated channel. The channels will collect the runoff from the side slopes, water transported through the drain net and run-off collected from the flatter sloped top. The top of the cover is variable sloped with an approximately 10 horizontal to 1 vertical (10:1) average. Surface runoff from this area will be diverted by a berm and collected at several locations and dropped into pipes that will carry the flows down the hill into the perimeter channels at the base of the landfill cover. Typical channel sections and locations are included on the drawings in Appendix A – Drawings.

When the landfill nears closure, a final design of the channels, drop structures, detention basin and erosion protection will be performed. At this time the use of swales, wattles, erosion control mats and other detail items will be assessed and incorporated into the design. Soil loss potential, flow velocities and other design parameters will be used in this assessment.

2.5.2.1 Run-off from Active Cells

Direct precipitation within the operating cells over the existing landfill will not be allowed to pond on or against any waste disposal areas. This will be accomplished by sloping the daily and intermediate soil covers away from the working face and toward the LCEP Direct precipitation within the operating cells of the existing operations will be conducted away from the working disposal areas by using a combination of a 2% eastward sloping cell bottom, and daily and intermediate soil covers. Precipitation coming into direct contact with the open landfill face will be directed to the lined evaporation pond/detention basins at the east end of each cell. Each detention basin is designed to hold all of the storm water runoff for the active waste disposal areas of the lined cells. The detention basins capacities are sized to manage the runoff from a 25-year, 24-hour storm event. Open faces during days of precipitation will be kept to an absolute minimum size.

A permanent evaporation pond/detention basin will be constructed over the lined area of the landfill once TJL reaches full capacity. A permanent stormwater pond will collect and store the storm waters (run-off) derived from direct precipitation on and around the landfill. These waters will be stored in the detention basins until evaporated. Drawing 7 – Final Cover details the location of the

permanent stormwater pond. Appendix L – Run-Off Data presents the computations on storm water management features.

2.5.2.2 Bingham Creek Flow Model

Due to the location of Bingham Creek adjacent to TJL, concerns have been raised regarding the impact on the landfall of high flows in the creek. In order to determine the behavior of Bingham Creek during the design (100-year, 24-hour) storm, its hydrology and hydraulics were evaluated based on a site visit, normal flow calculations, and the use of the HEC-1 and HEC-2 models of the United States Army Corps of Engineers (USACE).

In order to evaluate the peak flow occurring during the design storm, first the rainfall distribution was evaluated. Next, a HEC-1 model was constructed to route this storm through the Bingham Creek watershed to a point adjacent to the eastern edge of the landfill. A flood hydrograph for the channel at the eastern (downstream) end of the landfill was constructed.

A model of the 100-year, 24-hour flood in Bingham Creek adjacent to TJL was constructed. Total rainfall for the storm was 3.7 inches, with a maximum intensity of 0.43 inches in 5 minutes. The hydrologic model constructed for this watershed (HEC-1) predicted a peak flow of 564 cfs for this event. The hydraulic model constructed for this reach of channel (HEC-2) predicted an average flow depth of 2.3 ft and an average velocity of 6.1 ft/s in the reach of Bingham Creek adjacent to the landfill. Modeling results indicate that channel flows during the design storm would remain well away from the landfill boundaries, all flows would be contained in the reconstructed Bingham Creek channel. Appendix N – Bingham Creek Flow Model presents the hydrologic data on the 100-year storm event.

2.6 CLOSURE SCHEDULE

Closure will occur incrementally. Each Landfill Phase will be closed once it has been filled to design capacity. The following table summarizes by landfill phases the remaining landfill capacity and projected dates of service starting from May 1 of 2004:

Landfill Phase	Remaining Volume (cubic yards)	Remaining Capacity (tons)	Projected Date of Completion
Phase A (west end, unlined landfill)	Complete	Complete	_
Phase B (remaining	37,464	24,352	4/2004
Cell No. 1)			

Phase G (½ Cell No. 6) Phase H (½ Cell No. 6)	3,479,254	2,261,515	3/2030
·	2,969,532	1,930,193	2/2025
Phase F (Cell No. 5)	2,342,454	1,522,595	7/2020
Phase E (Cell No. 4)	3,225,154	2,096,350	10/2016
Phase D (Cell No. 3)	2,505,782	1,628,759	5/2011
Cell No. 2)			
Phase C (remaining	907,576	589,924	12/2006

To estimate the landfill life and project the timing of constructed projects; engineering assumptions about the extent of each Phase was made to be able to calculate volumes. The length of time that each Phase will be in service will depend upon the day to day operation of the landfill and will vary from the specific dates of closure presented above. It may be necessary, due to site access requirements, to partially fill future Phases to allow for final waste placement within a particular Phase.

When closure of Phase H is completed, TJL shall submit the following to the Executive Secretary:

- As-built unit closure plan sheet(s) signed by a professional engineer registered in the State of Utah.
- Certification by Trans-Jordan and a professional engineer registered in the State
 of Utah that the site has been closed in accordance with the approved closure
 plan.
- Closure plans and certification of closure will be submitted with the closure of each Landfill Phase.

2.7 CLOSURE AND POST-CLOSURE CARE PLANS

Sections 4 and 5 of Part II detail the methodology for both the Closure and the Post Closure Care plans.

2.8 POST-CLOSURE LAND USE - EXISTING AND PROPOSED LANDFILL EXPANSION

TJL staff or a TJL contractor will design a post-closure end use plan for the landfill at the time of final closure. TJL will select an end use that will be limited to those that do not threaten the integrity of the existing control systems. All closure activities will be designed to be consistent with surrounding land use. Typical end uses range from recycling operations (which complement existing operations) to recreational activities. Since the closure of the site may be nearly 25 years

away, it is not currently possible to develop those land use plans to be consistent with surrounding land uses and the needs of the area that may be relevant at that future time. Appendix N – Future Land Use indicates the anticipated master plan for the land surrounding TJL.

2.9 FINANCIAL ASSURANCE

2.9.1 Closure Costs

Cost estimates have been developed for the closure Phases at TJL. Appendix H – Closure/Post Closure Costs contains the most recent Closure cost data for the TJL. Closure costs are updated each year and submitted with the Annual Report.

2.9.2 Post-Closure Care Costs

Cost estimates have been developed for the Post-Closure care period at TJL. Appendix H – Closure/Post Closure Costs contains the most recent Post-Closure cost data for the TJL. Post-Closure costs are updated each year and submitted with the Annual Report.

2.9.3 Financial Assurance Mechanism

TJC maintains a trust agreement with Zion's Bank to cover the financial assurance requirements of the TJL. Appendix – P contains a copy of the trust agreement utilized for the financial assurance at TJL.

SECTION 3 - REFERENCES

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APPENDIX A - DRAV

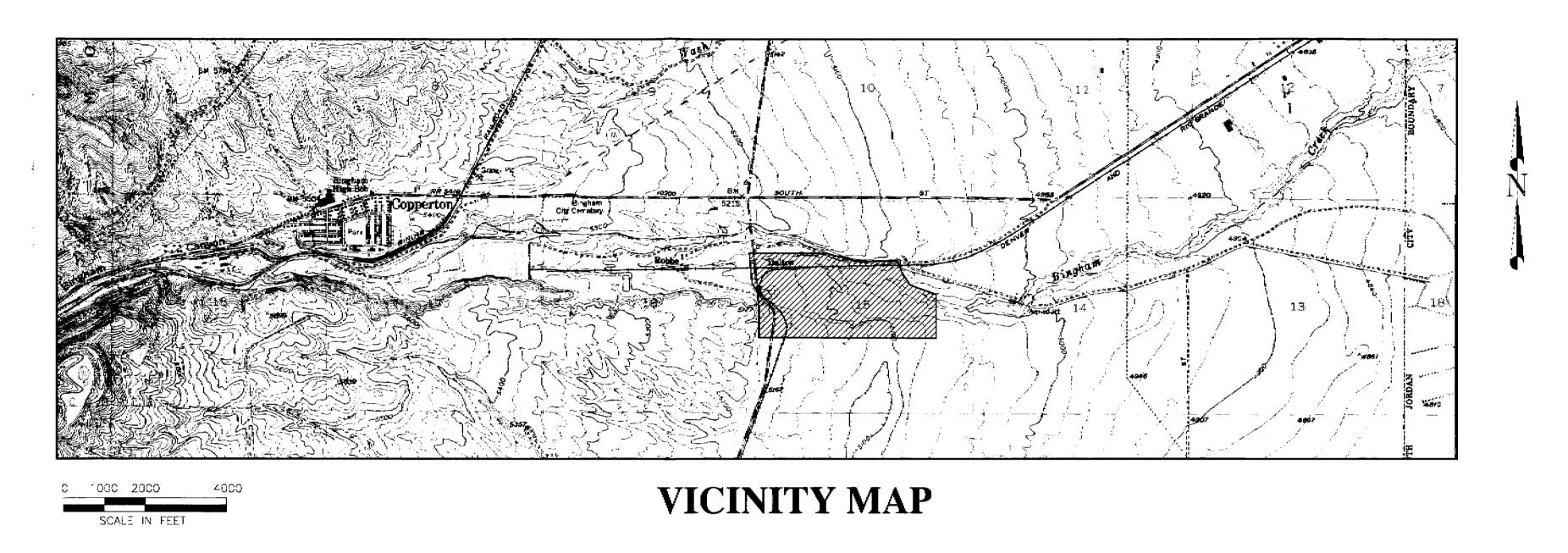
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- 2. General Arrangement
- 3. Sections Existing
- 4. Lined/Unlined Landfill
- 5. Future Landfill Develor
- 6. Future Landfill Develop
- 7. Final Cover
- 8. Final Landfill Section a
- 9. Details

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LOCATION MAP

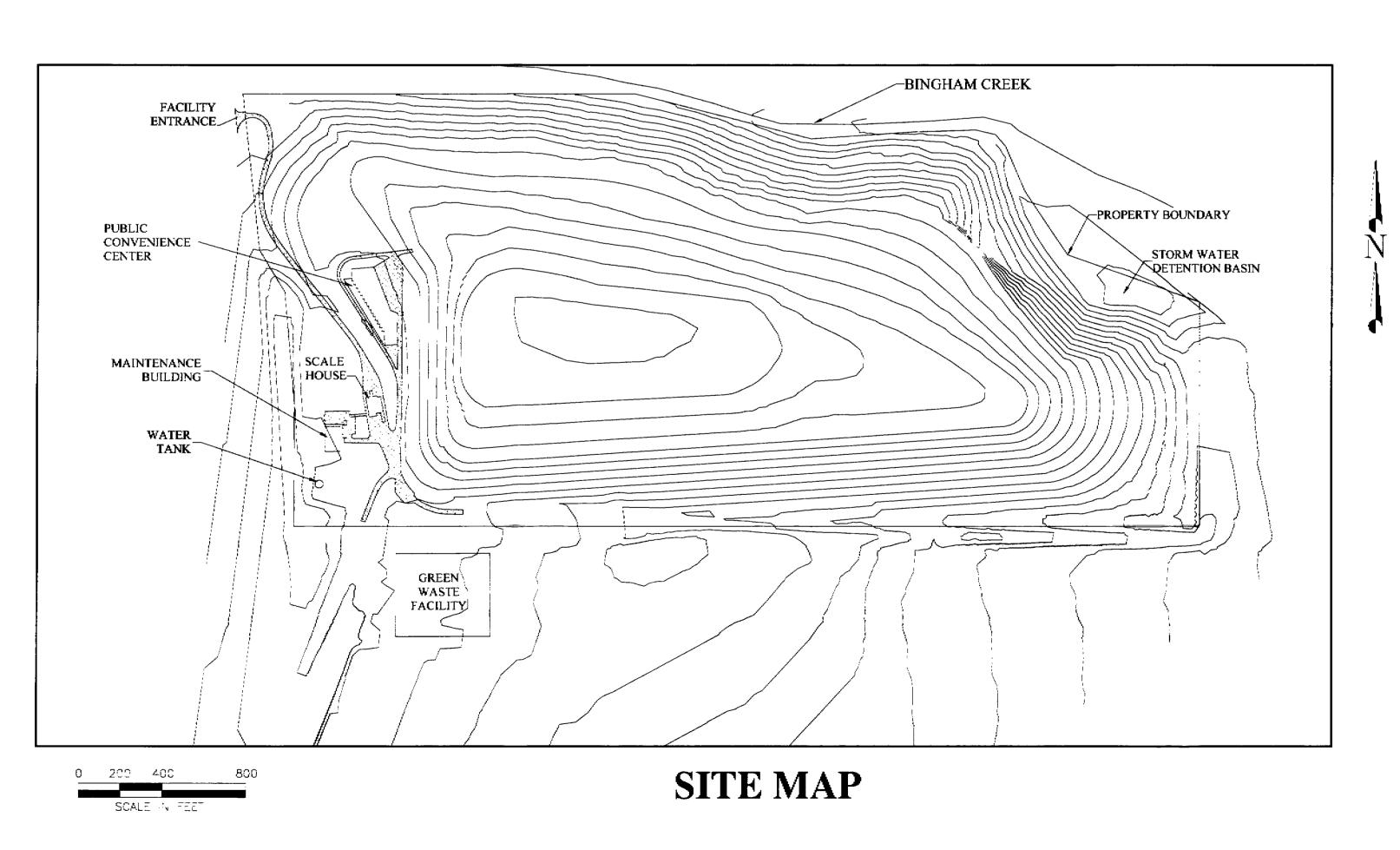
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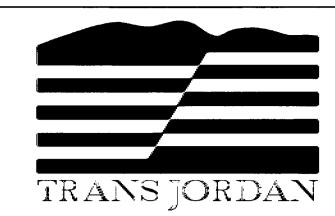
TRANS-JORDAN LANDFILL 2004 PERMIT RENEWAL



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- 2 GENERAL ARRANGEMENT
- 3 SECTIONS EXISTING
- 4 LINED/UNLINED LANDFILL CELLS
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- 7 FINAL COVER
- 8 FINAL LANDFILL SECTION & LIFE
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3/31/04 PERMIT (DRAFT)
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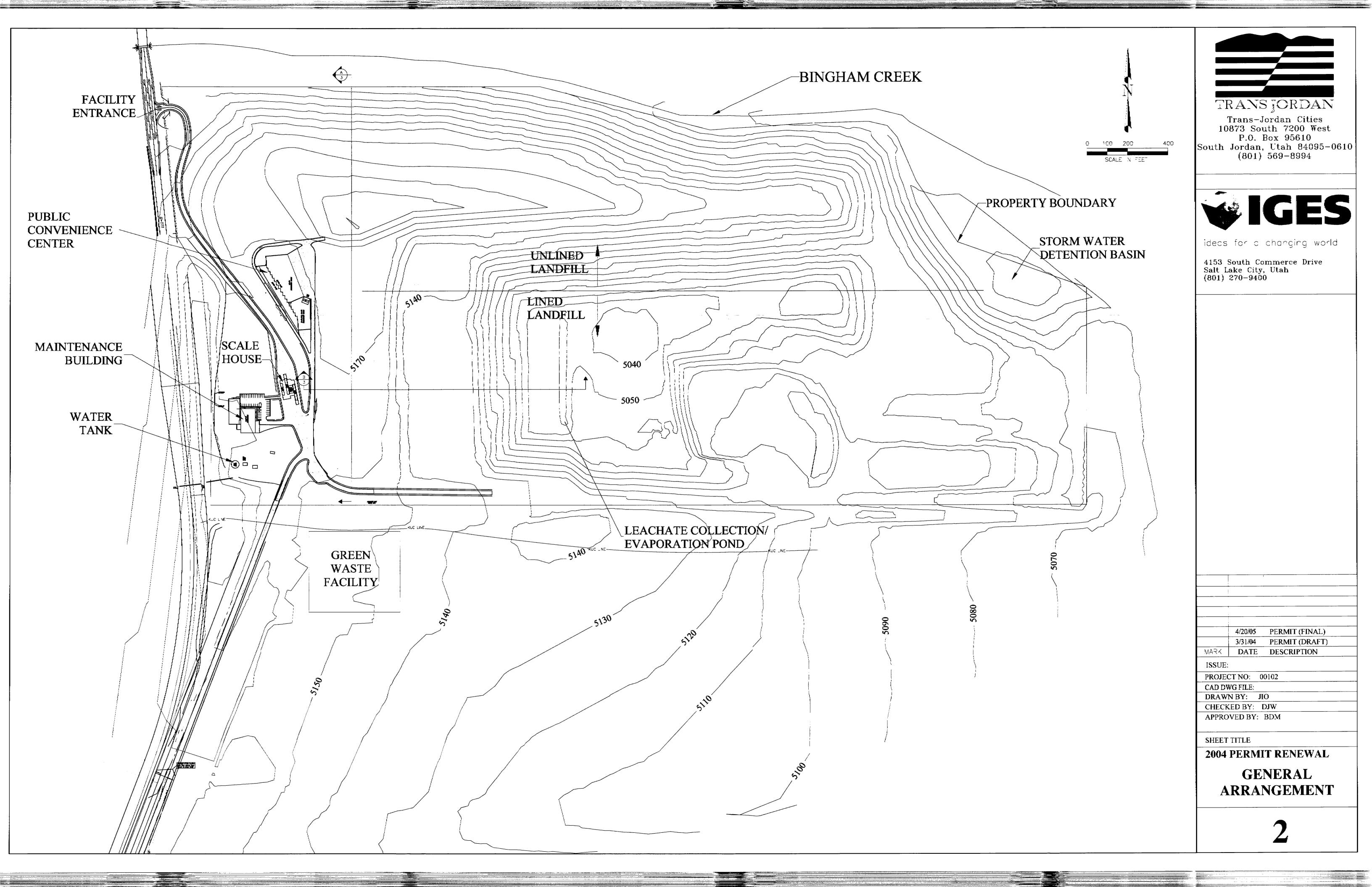
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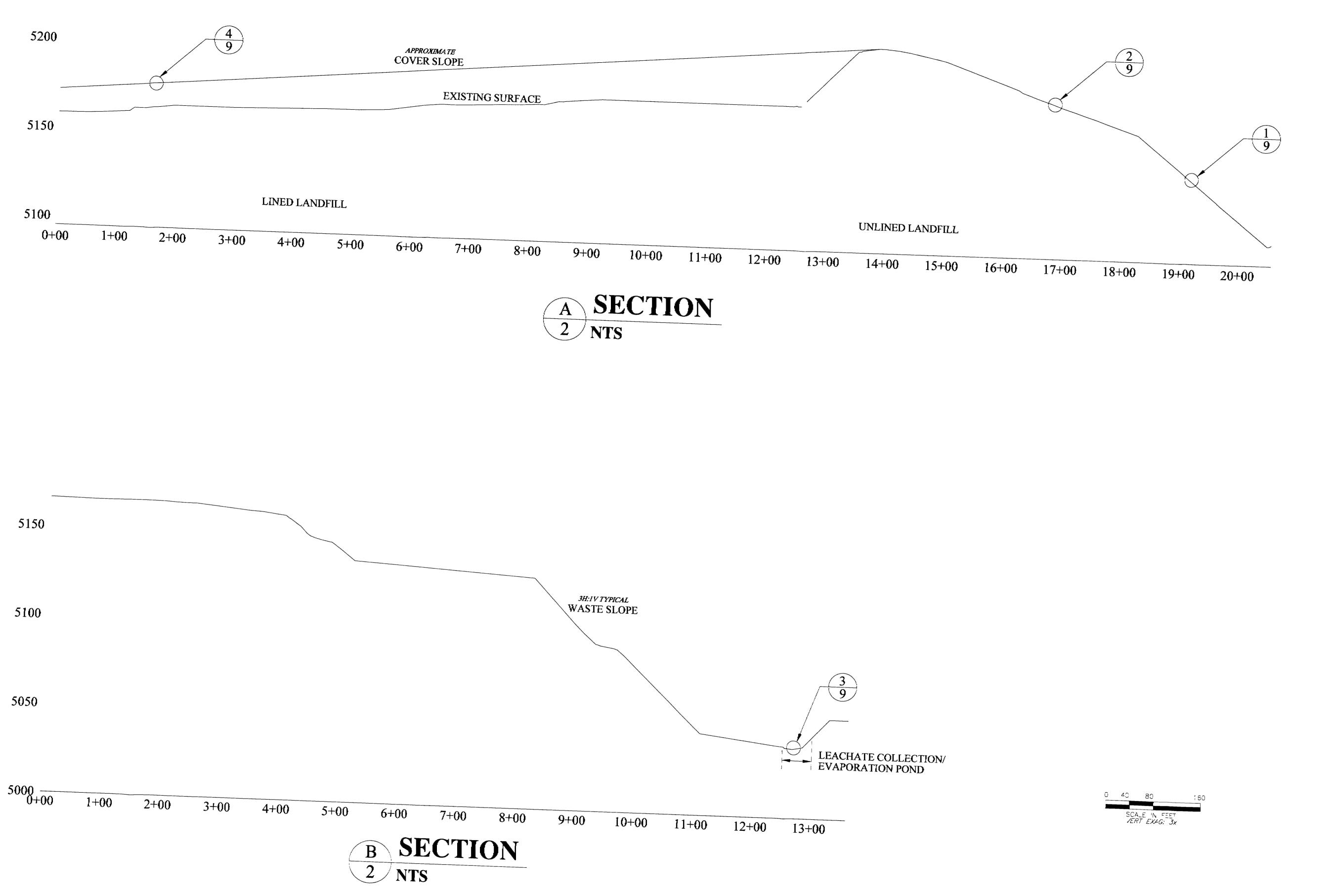
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ISSUE:

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TITLE SHEET AREA MAPS







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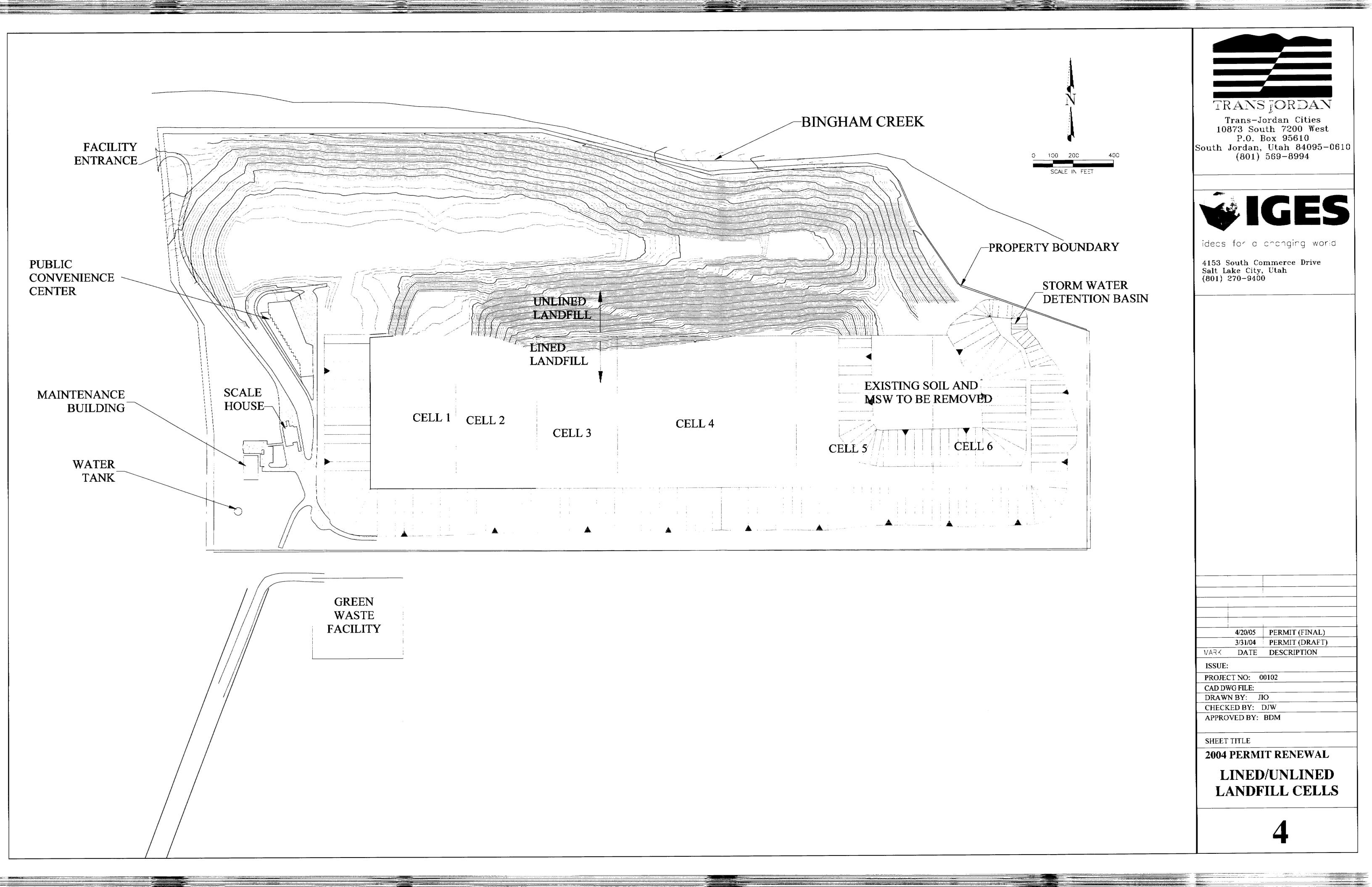
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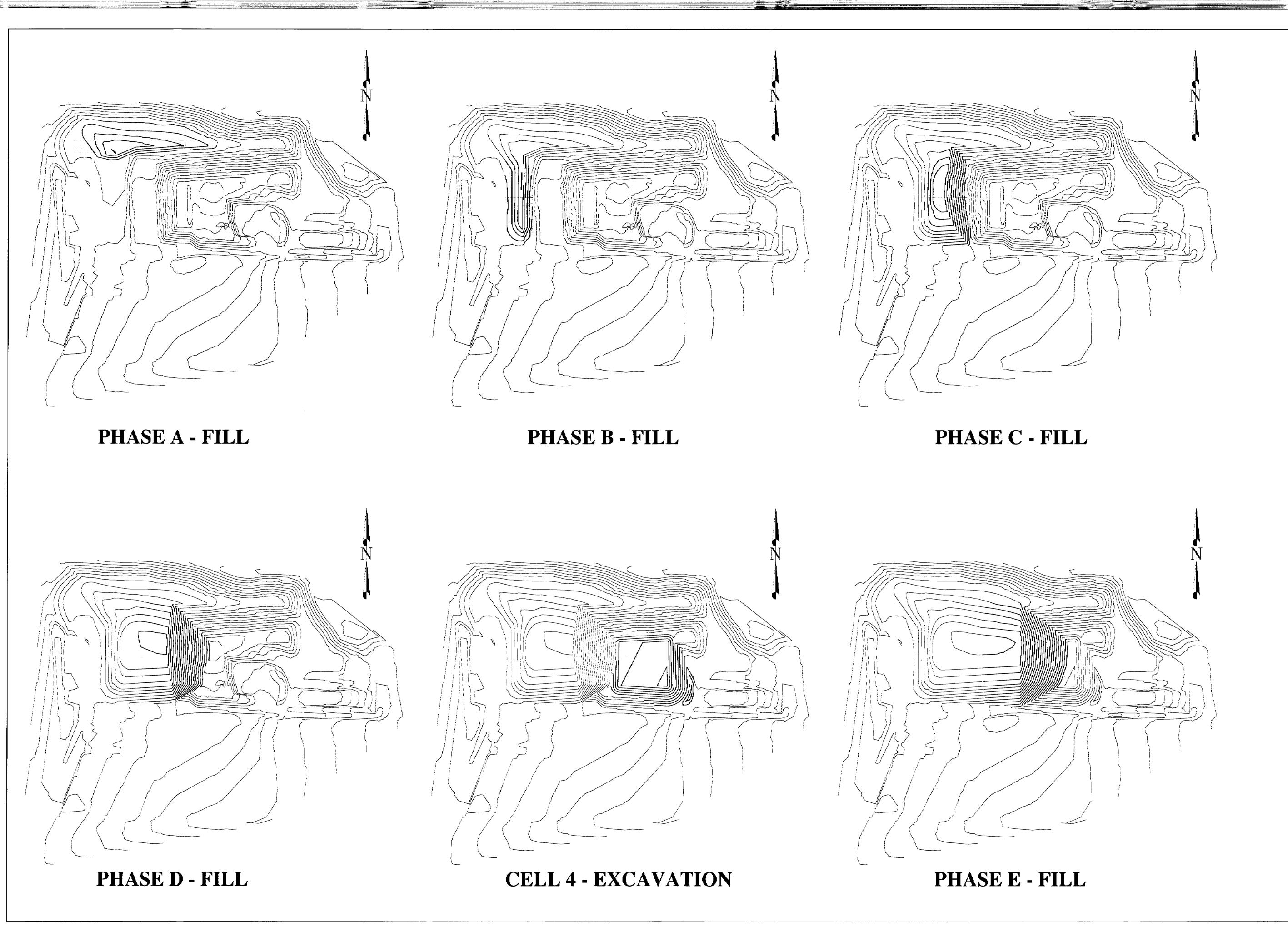
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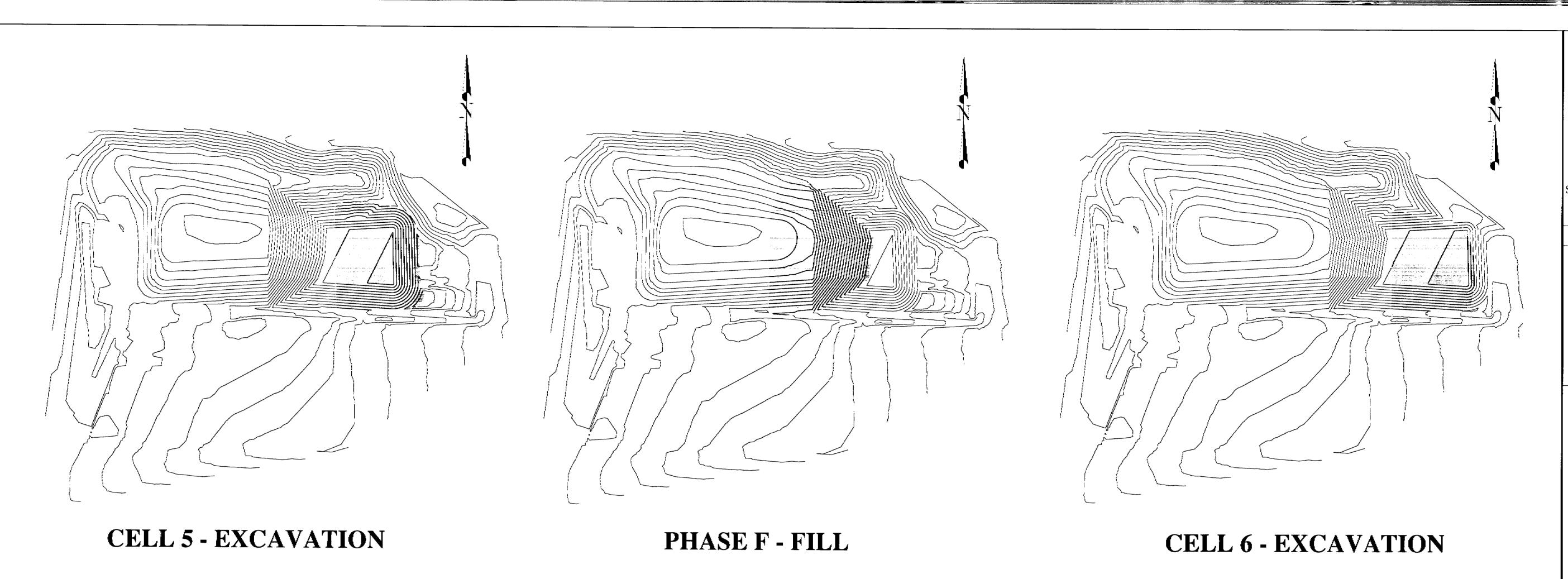
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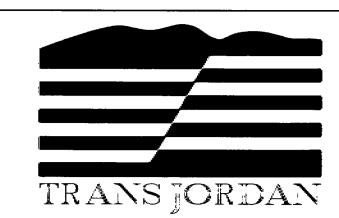
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FUTURE LANDFILL DEVELOPMENT



PHASE G - FILL

PHASE H - FILL



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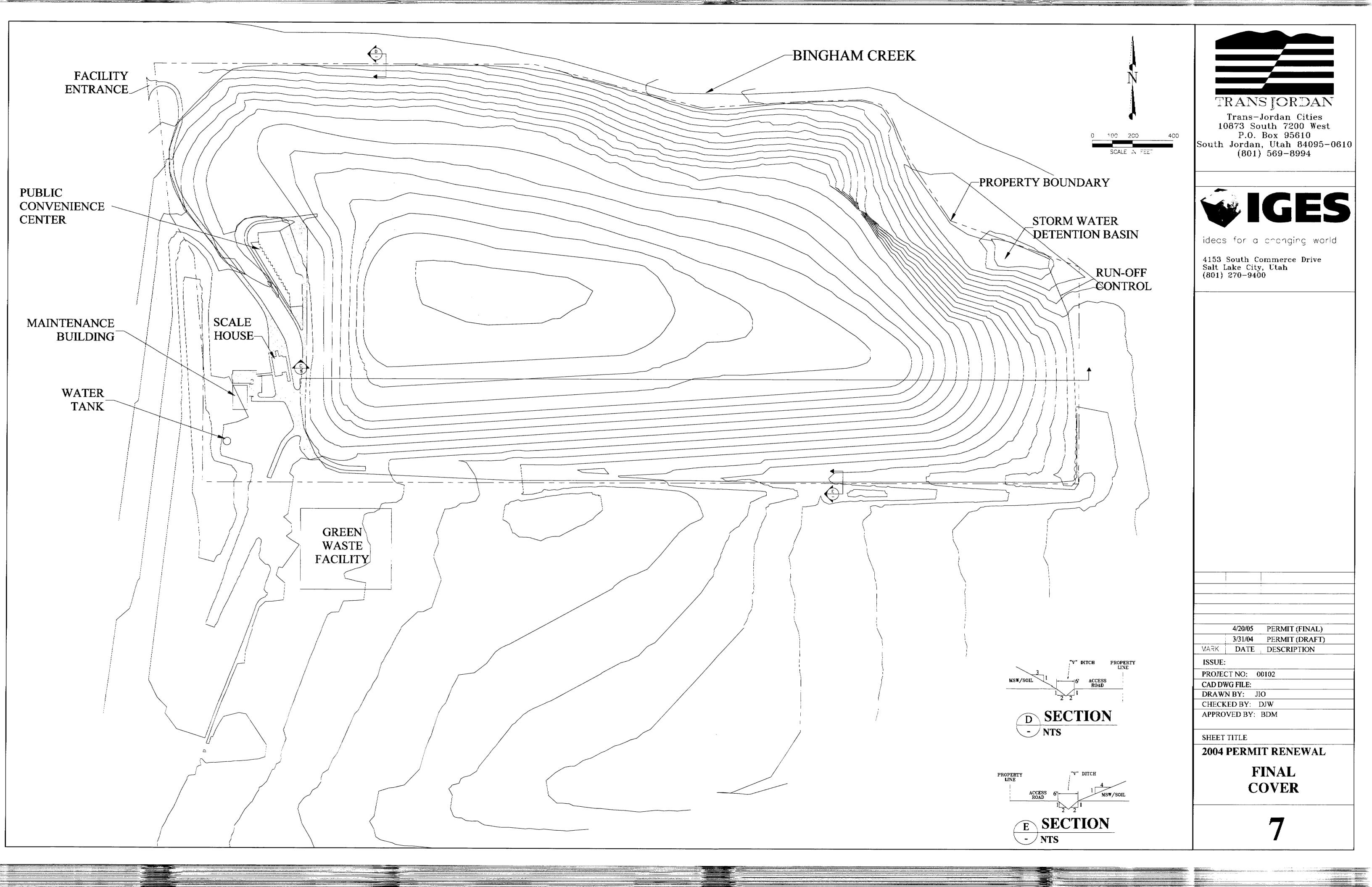
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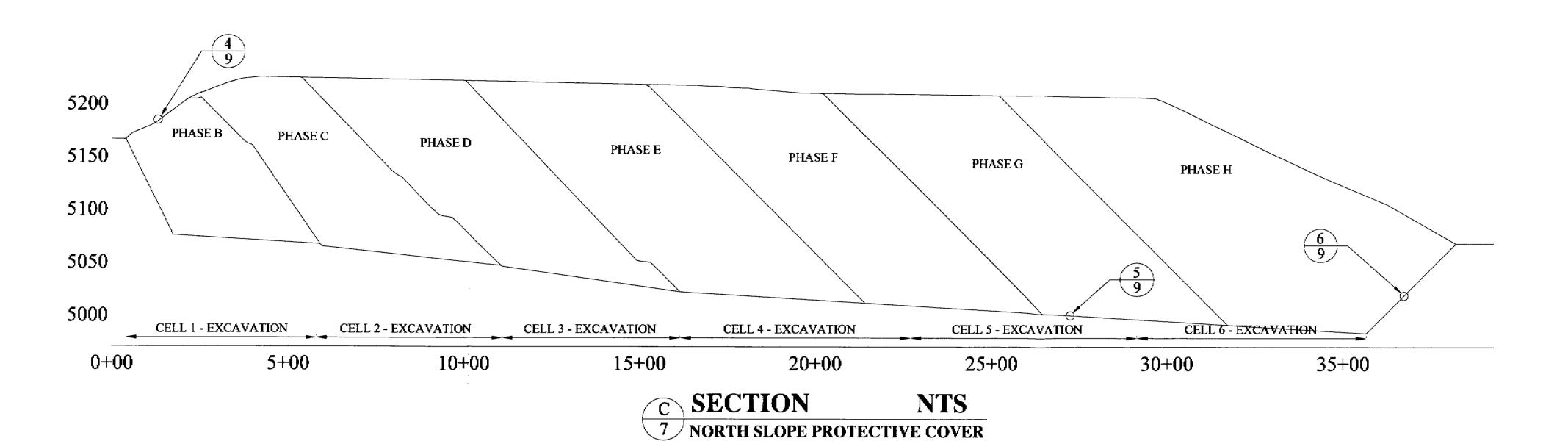
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FUTURE LANDFILL DEVELOPMENT





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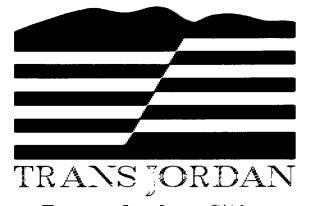
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	Year	in Place	Tons	Yearly Tons	(Tons)	(2%/Year Inc.)	(Tons)	Refuse (Cu. Yds.)	Sail (Cu. Yds.)	(Cu. Yds.)	Refuse (Mg)	
- -		Refuse (Tons)		(1956-1987)				(@1300#/Cu, Yd.)	(@20% use)			
	1050	B 004	0.004	0.005			0.044					
	1956	2,204	2,204	2,865			2,865	4,407	881	5,288	2600	
	1957	6,612	4,408	5,730			8,596	13,220	2,644	15,864	7,800	İ
	195B	13,224	6,612	8,596			17,191	26,440	5,288	31,728	15,600	ł
	1959	22,040	8,816	11,461			28,652	44,067	8,813	52,880	26,000	
	1960	33,611	11,571	15,042			43,694	67,202	13,440	80,642	39,650	
	1961	47,937	14,326	18,624			62,318	95,845	19,169	115,014	56,550	
	1962	63,475	15,538	20,200			82,518	126,912	25,382	152,295	74,880	
	1963	80,336	16,861	21,919			104,437	160,623	32,125	192,748	94,770	i
	1964	98,739	18,403	23,924			128,361	197,419	39,484	236,903	116,480	
	1965	118,685	19,946	25,930			154,291	237,300	47,460	284,760	140,010	i
	1966	140,395	21,709	28,222			182,513	280,705	56,141	336,846	165,620	i
	1967	164,088	23,693	30,801			213,314	328,077	65,615	393,693	193,570	
	1968	189,544	25,456	33,093			246,407	378,974	75,795	454,769	223,600	
	1969	217,755	28,211	36,675			283,082	435,380	87,076	522,456	256,880	
	1970	248,170	30,415	39,540			322,622	496,192	99,238	595,430	292,760	
	1971	281,230	33,060	42,978			365,600	562,292	112,458	674,750	331,760	
	1972	317,156	35,925	46,703			412,302	634,121	126,824	760,945	374,140	
	1973	356,277	39,121	50,857			463,160	712,339	142,468	854,807	420,290	
	1974	398,814	42,537	55,298			518,458	797,388	159,478	956,866	470,470	
	1975	445,098	46,284	60,169			578,627	889,929	177,986	1,067,914	525,070	i
	1976	495,349	50,251	65,327			643,954	990,401	198,080	1,188,481	584,350	
	1977	550,008	54,659	71,057			715,011	1,099,6 8 6	219,937	1,319,624	648,830	i
	1978	609,516	59,508	77,360			792,371	1,218,667	243,733	1,462,400	719,030	
	1979	674,204	64,687	84,094			876,465	1,348,003	269,601	1,617,603	795,340	
	1980	744,621	70,418	91,543			968,00B	1,488,796	297,759	1,786,555	878,410	
	1981	821,100	76,479	99,422			1,067,430	1,641,708	328,342	1,970,049	968,630	ĺ
	1982	904,301	83,201	108,161			1,175,592	1,808,060	361,612	2,169,672	1,066,780	
	1983	994,775	90,474	117,616			1,293,208	1,988,954	397,791	2,386,745	1,173,510	
	1984	1,093,184	98,409	127,931			1,421,139	2,185,712	437, 142	2,622,855	1,289,600	
	1985	1,200,078	106,894	138,962			1,560,101	2,399,436	479,887	2,879,323	1,415,700	
	1986	1,316,890	116,812	151,856			1,711,957	2,632,990	526,598	3,159,588	1,553,500	
	1987	1,443,620	126,730	164,749			1,876,706	2,886,374	577,275	3,463,649	1,703,000	
	1988				172,257		2,048,963	3,151,305	630,261	3,781,566	1,859,313	
	1989				171,303		2,220,266	3,414,769	682,954	4,097,723	2,014,760	
	1990				147,564		2,367,B30	3,641,723	728,345	4,370,067	2,148,666	
	1991				172,905		2,540,735	3,907,650	781,530	4,689,181	2,305,567	
	1992				208,861	i	2,749,596	4,228,879	B45,776	5,074,654	2,495,096	
	1993				172,599		2,922,195	4,494,336	B98,867	5,393,203	2,651,720	
	1994				205,308		3,127,503	4,810,100	962,020	5,772,120	2,838,0 25	
	1995	į			234,329		3,361,832	5,170,498	1,034,100	6,204,597	3,050,664	
	1996	İ			245,381		3,607,213	5,5 47,894	1,109,579	6,657,472	3,273,333	
	1997				251,387		3,858,600	5,934,527	1,186,905	7,121,432	3,501,452	
	199B				261,626		4,120,226	6,336,908	1,267,382	7,604,289	3,738,862	
	1999				280,706		4,400,932	6,768,633	1,353,727	8,122,360	3,993,586	
	2000				280,857		4,681,789	7,200,591	1,440,118	8,640,710	4,248,447	
	2001	<u> </u>			307,612		4,989,401	7,673,699	1,534,740	9,208,438	4,527,587	
Ŀ	2002				299,469		5,288,870	8,134,282	1,626,856	9,761,138	4,799,338	

Year	Given Cumulative In Place Refuse (Tons)	Yearly Tons	Adjusted 30% Inc. Yearly Tons (1956-1987)	Actual Scale Data (Tons)	Projected Tons (296/Year Inc.)	Adjuste d Wastestream (Tons)	In Place Refuse (Cu. Yds.) (@1300#/Cu. Yd.)	In Place Soil (Cu. Yds.) (@20% use)	Air Space Consumed (Cu. Yds.)	Corrected In Place Refuse (Mg)	
2003					307,005	5,595 ,87 5	8,606,456	1,721,291	10,327,747	5,077,926	Phase A
2004					313,145	5,909,020	9,088,073	1,817,615	10,905,687	5,362,087	Phase B
2005					319,408	6,228,428	9,579,322	1,915,864	11,495,187	5,651,931	Phase C
2006					325,796	6,554,224	10,080,397	2,016,079	12,096,476	5,947,572	
2007	'				332,312	6,886,536	10,591,493	2,118,299	12,709,791	6,249,126	Phase D
200 8					338,958	7,225,495	11,112,811	2,222,562	13,335,373	6,556,710	
2009					345,737	7,571,232	11,644,555	2,328,911	13,973,466	6,870,447	1
2010					352,652	7,923,884	12,186,934	2,437,387	14,624,321	7,190,458	I
2011					359,705	8,283,590	12,740,161	2,548,032	15,288,193	7,516,869	1
2012					366,899	8,650,489	13,304,452	2,660,890	15,965,343	7,849,809	Phase E
2013			1 1		374,237	9,024,726	13,880,029	2,776,006	16,656,035	8,189,407	
2014					381,722	9,406,449	14,467,118	2,893,424	17,360,542	8,535,797	
2015					389,357	9,795,805	15,065,948	3,013,190	18,079,138	8,889,115	
2016					397,144	10,192,949	15,676,755	3,135,351	18,812,106	9,249,500	
2017					495,0B7	10,598,035	16,299,779	3,259,956	19,559,734	9,617,092	Phase F
2018					413,188	11,011,224	16,935,262	3,387,052	20,322,315	9,992,036	
2019					421,452	11,432,676	17,583,455	3,516,691	21,100,147	10,374,479	
2020			_		429,881	11,862,557	18,244,613	3,648,923	21,893,535	10,764,571	
2021					438,479	12,301,036	18,918,993	3,783,799	22,702,791	11,162,464	Phase G
2022					447,248	12,748,284	19,606,861	3,921,372	23,528,233	11,568,316	
2023			1		456,193	13,204,477	20,308,486	4,061,697	24,370,183	11,982,284	
2024	i				465,317	13,669,794	21,024,144	4,204,829	25,228,973	12,404,532	
2025					474,623	14,144,418	21,754,115	4,350,823	26,104,938	12,835,225	
2026					484,116	14,628,534	22,498,685	4,499,737	26,998,422	13,274,532	Phase H
2027					493,798	15,122,332	23,258,147	4,651,629	27,909,776	13,722,624	
2028					503,674	15,626,006	24,032,798	4,806,560	28,839,357	14,179,679	
2029					513,748	16,139,754	24,822,942	4,964,588	29,787,530	14,645,875	

* Volume of existing landfill as of October 2002

**Remaining air space as of October 2002 (19,809,474 cy) added to the waste in-place in October 2002

*** Excludes North side slopes



TRANS JORDAN

Trans-Jordan Cities
10873 South 7200 West
P.O. Box 95610
South Jordan, Utah 84095-0610
(801) 569-8994



ideas for a changing world

4153 South Commerce Drive Salt Lake City, Utah (801) 270-9400

4/20/05 PERMIT (FINAL) 3/31/04 PERMIT (DRAFT) MARK DATE DESCRIPTION

ISSUE:

PROJECT NO: 00102

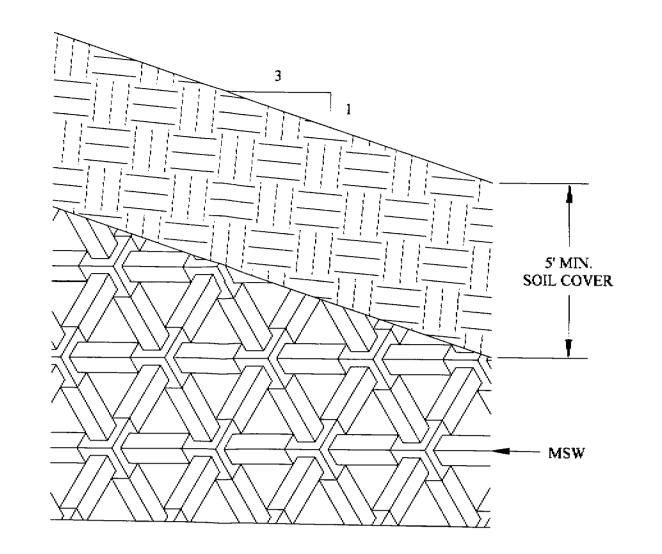
CAD DWG FILE: DRAWN BY: JIO

CHECKED BY: DJW APPROVED BY: BDM

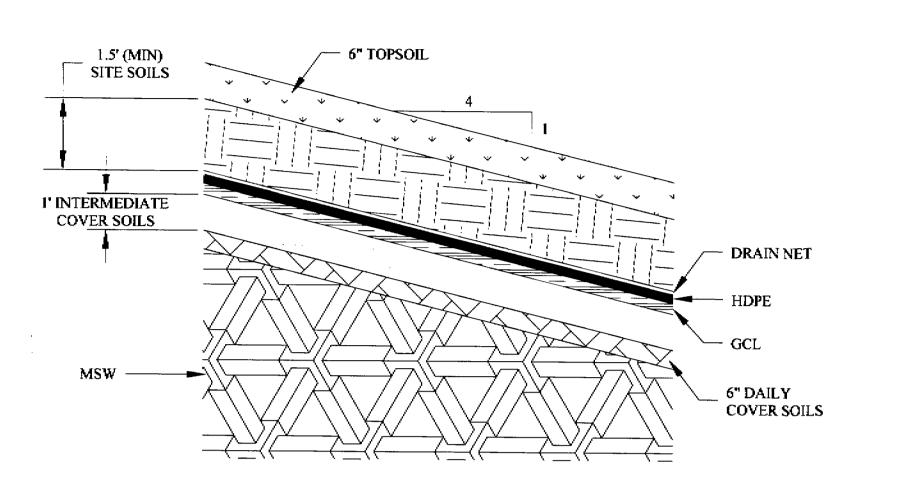
SHEET TITLE

2004 PERMIT RENEWAL

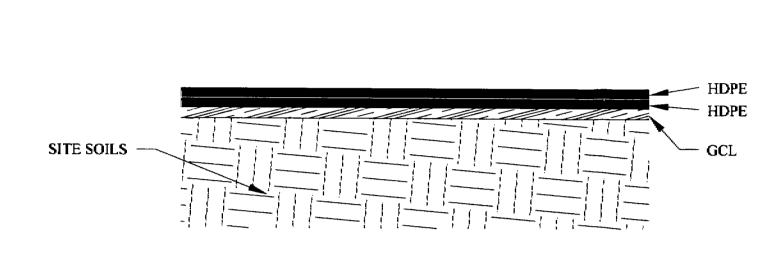
FINAL LANDFILL **SECTION & LIFE**



1 DETAIL NTS
3 NORTH SLOPE PROTECTIVE COVER

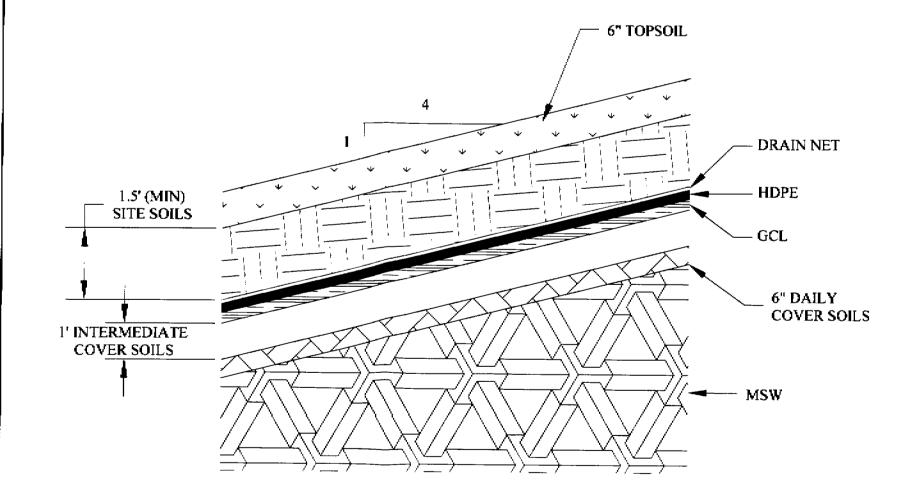


2 DETAIL NTS
3 UNLINED LANDFILL COVER

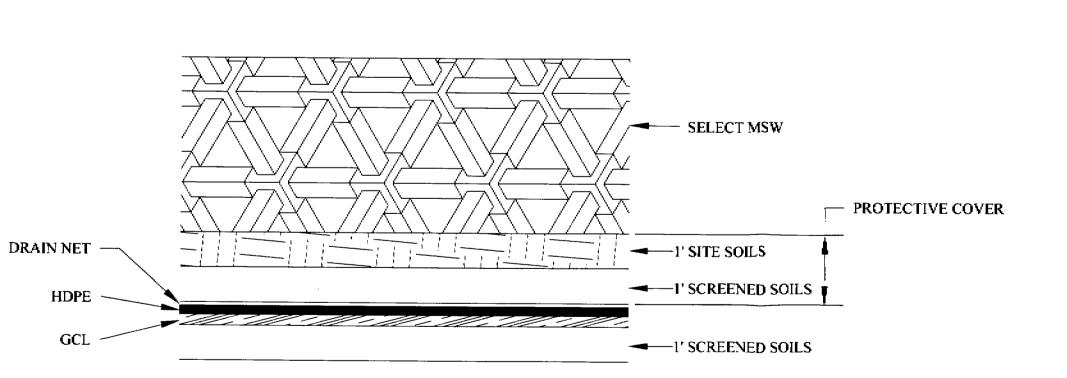


3 DETAIL NTS

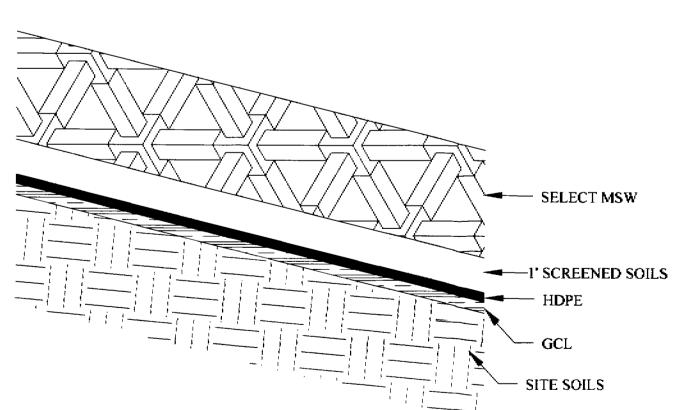
3 LEACHATE COLLECTION/
EVAPORATION POND LINER



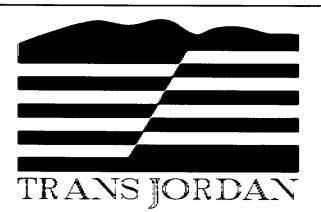
4 4 DETAIL NTS
3 8 LINED LANDFILL COVER



5 DETAIL NTS
8 LANDFILL CELL BASE LINER



6 DETAIL NTS
8 LANDFILL SLOPE LINER



Trans-Jordan Cities 10873 South 7200 West P.O. Box 95610 South Jordan, Utah 84095-0610 (801) 569-8994



ideas for a changing world

4153 South Commerce Drive Salt Lake City, Utah (801) 270-9400

4/20/05 PERMIT (FINAL)
3/31/04 PERMIT (DRAFT)

MARK DATE DESCRIPTION

ISSUE:

PROJECT NO: 00102

CAD DWG FILE:

SHEET TITLE

DRAWN BY: JIO CHECKED BY: DJW

APPROVED BY: BDM

2004 PERMIT RENEWAL

DETAILS

APPENDIX B – LEGAL DESCRIPTION & PROPERTY OWNERSHIP



()

Trans-Jordan Landfill Property Description
A parcel of land in Section 15, Township 3 South, Range 2 West, Salt Lake Base and Meridian, Salt Lake County, Utah, containing 190.0468 acres and being more particularly described as follows.

Beginning at a point S89 □ 41'17" E 183.50 feet from a rock monument at the West quarter corner of said Section 15, said rock monument bears N0 □ 04'19"E 2643.87 feet (basis of bearing) from a brass cap monument at the Southwest corner of said Section 15, said point also being on the Easterly line of Salt Lake County Road 111 (formerly U-111); thence N19 44'29"W 213.44 and N6□11'36"W 753.84 feet along said Easterly line of County Road 111; thence S89 45'42"E 1783.29 feet: thence S81 14'37"E 402.07 feet: thence S77 13'31"E 165.34 feet; thence S74 37'58"E 201.08 feet; thence \$70\,_00'29"E 148.20 feet: thence \$79\,_19'04"E 107.15 feet: thence S87 □07'45"E 89.27 feet; thence N86 □30'28"E 63.83 feet; thence N79 □00'30"E 49.95 feet; thence 74 □ 47'30" E 162.12 feet; thence N85 □ 06'53" E 59.90 feet; thence N89 26'10"E 304.89 feet: thence S81 15'35"E 50.02 feet: thence S68 □ 45'39"E 49.96 feet; thence S51 □ 41'10"E 49.91 feet; thence S32 □ 01'58"E 50.11 feet; thence S23 33'11"E 169.05 feet; thence S28 07'40"E 138.34 feet; S33 □25'02"E 290.94 feet; thence S70 □13'26"E 679.75 feet; thence S0 □14'18"W 1075.58 feet; thence N89 45'42"W 4348.02 feet to a point on said Easterly line of County Road 111; thence along said Easterly line of County Road 111 the following four courses, (1) Northwesterly 33.15 feet along the arc of a 2934.90 foot radius curve to the left through a central angle of 0□38'50" (chord bears N5□52'10"W 33.15 feet). (2) N6□11'36"W 353.2 feet. (3) N2□20'14"E 202.24 feet. (4) N6 11'36"W 542.50 feet to the point of beginning.

Recorde	d at the Requ	est of					
at		. M.	Fee Paid \$				
Mail tax	notice to: T	rans-Jo	ordan Cities				
Address:	10873 Sout	h 7200	West, P. O.	Box 95610,	South Jordan,	Utah	84095-0610

QUIT-CLAIM DEED

TRANS-JORDAN CITIES, a political subdivision of the State of Utah, hereby QUIT-CLAIMS to GRANTEE, TRANS-JORDAN CITIES, a political subdivision of the State of Utah, for the sum of TEN DOLLARS, (\$10.00), and other good and valuable consideration, the following tract of land located in Salt Lake County, State of Utah for the purpose of consolidating three separate parcels of property into a single parcel of land described as follows:

A parcel of land located in Section 15, Township 3 South, Range 2 West, Salt Lake Base and Meridian, Salt Lake County, Utah, containing 190.0470 acres and being more particularly described as follows.

Beginning at a point on the east line of Highway 111, said point being N0°02'33"E 949.46 feet along the section line and S89°45'42"E 29.37 from a stone monument at the West quarter corner of said Section 15, said stone monument bears S0°02'33"W 2644.02 feet (basis of bearing) from a stone monument at the northwest corner of said section 15;

```
thence S89°45'42"E 1783.29 feet:
                                    thence $81°14'37"E 402.07 feet:
thence $77°13'31"E 165.34 feet;
                                    thence S74°37'58"E 201.08 feet:
thence $70°00'29"E 148.20 feet;
                                    thence $79°19'04"E 107.15 feet:
thence S87°07'45"E 89.27 feet;
                                   thence N86°30'28"E 63.83 feet:
thence N79°00'30"E 49.95 feet:
                                   thence N74°47'30"E 162.12 feet;
thence N85°06'53"E 59.90 feet;
                                   thence N89°26'10"E 304.89 feet:
thence S81°15'35"E 50.02 feet;
                                   thence $68°45'39"E 49.96 feet;
thence S51°41'10"E 49.10 feet;
                                   thence $32°01'58"E 50.11 feet;
thence S23°33'11"E 169.05 feet:
                                   thence S28°07'40"E 138.34 feet:
thence S33°25'02"E 290.94 feet;
                                   thence S70°13'26"E 679.73 feet;
thence S0°14'17"W 1075.58 feet;
thence N89°45'42"W 4348.03 feet to the east line of said Highway 111;
thence continuing along said east line of Highway 111 the following six courses:
```

- 1. Northwesterly 33.14 feet along the arc of a 2934.90 foot radius curve to the left through a central angle of 0°38'49" (chord bears N5°52'31"W 33.14 feet);
- 2. N6°11'33"W 353.20 feet.
- 3. N2°20'17"E 202.24 feet.
- 4. N6°11'35"W 542.50 feet.
- N19°44'29"W 213.44 feet.
- 6. N6°11'36"W 753.84 feet to the point of beginning.

Containing Parcel Nos.:

26-15-300004	4.51 ac
26-15-300013	184.19 ac
26-15-300011	<u>.96</u> ac
	190.05 ac

8726492 07/10/2003 01:53 PH NO FEE Book - 8838 P3 - 3270-3271 GARY W. OTT RECORDER, SALI LAKE COUNTY, UTAH TRANS JORDAN CITIES 10873 S 7200 W PO EOX 95610 SOUTH JORDAN UT 84095-0610 BY: SEN, DEPUTY - WI 2 F.

quickclaimdeed 894006/HCH/msp Witness the hand of said Grantor, this 20 day of June, 2003.

TRANS-JORDAN CITIES

Its Chairman

STATE OF UTAH

COUNTY OF SALT LAKE

On the 30 day of June, 2003, personally appeared before me, Tom DeSpain, signer of the foregoing instrument, who duly acknowledged to me that he executed the same.

[SEAL]

KAYE M. ASTILL

NOTARY PUBLIC - STATE OF UTAH **MURRAY, UT. 84123**

NAME TRANS-JORDAN CITIES NEW/UPDT N TAX DIST OK 38 CONT ASR DATE 03/16/2004 C/O,AT ACREAGE 190.05 STREET EDIT СТТҮ TE \mathbf{L}_{l} EDIT CERTIFY ASSR BATCH NO 268 SEO 504 UM_~1MN EDIT N PLAT PROPERTY DESCRIPTION 1 BEG N 0-02'33" E 949.46 FT & S 89-45'42" E 29.37 FT FR W 1/4 WORK CRD DESC 2 COR OF SEC 15, T 3S, R 2W, SLM; S 89-45'42" E 1783.29 FT; S **DESC** 3 81¬14'37" E 402.07 FT; S 77¬13'31" E 165.34 FT; S 74¬37'58" **DESC** 4 E 201.08 FT; S 70-00'29" E 148.20 FT; S 79-19'04" E 107.15 DESC 5 FT; S 87-07'45" E 89.27 FT; N 86-30'28" E 63.83 FT; N DESC DESC 6 79¬00'30" E 49.95 FT; N 74¬47'30" E 162.12 FT; N 85¬06'53" E 7 59.90 FT; N 89-26'10" E 304.89 FT; S 81-15'35" E 50.02 FT; S DESC 15 DESC 8 68¬45'39" E 49.96 FT; S 51¬41'10" E 49.10 FT; S 32¬01'58" E DESC LINES 9 50.11 FT; S 23¬33'11" E 169.05 FT; S 28¬07'40" E 138.34 FT; DESC

10 S 33¬25'02" E 290.94 FT; S 70¬13'26" E 679.73 FT; S 0¬14'17"

26-15-300-004-0000 26-15-300-013-0000 26-15-300-011-0000

DESC

OLD PARCEL NUMBERS

MORE TOTAL 3

MORE

NAME TRANS-JORDAN CITIES NEW/UPDT N TAX DIST OK 38

CONT ASR DATE 03/16/2004

C/O,AT ACREAGE 190.05

STREET EDIT

CITY

LC TE EDIT CERTIFY ASSR BATCH NO 268 SEO 504 EDIT N PLAT UNILIWN

PROPERTY DESCRIPTION

11 W 1075.58 FT; N 89¬45'42" W 4348.03 FT TO EAST LINE OF 12 HIGHWAY 111; NW'LY ALG A 2934.90 FT RADIUS CURVE TO L 33.14 DESC WORK CRD

DESC PRINTED

13 FT (CHORD N 5-52'31" W 33.14 FT); N 6-11'33" W 353.20 FT; N DESC

DESC 14 2-20'17" E 202.24 FT; N 6-11'35" W 542.50 FT; N 19-44'29" W

DESC 15 213.44 FT; N 6-11'36" W 753.84 FT TO BEG. 190.05 AC.

15 DESC LINES

MORE

OLD PARCEL NUMBERS

26-15-300-004-0000 26-15-300-013-0000 26-15-300-011-0000

MORE TOTAL 3

APPENDIX C – MODIFIED CORRECTIVE ACTION PLAN





State of Utah

Department of Environmental Quality

Dianne R. Nielson, Ph.D. Executive Director

DIVISION OF SOLID & HAZARDOUS WASTE Dennis R. Downs
Director

OLENE S. WALKER
Governor

GAYLE F. McKEACHNIE
Lieutenant Governor



January 23, 2004

Dwayne J. Woolley, General Manager Trans Jordan Landfill 10873 South 7200 West South Jordan, Utah 84095-5610

RE: Modified Corrective Action Plan Approval

Dear Mr. Woolley:

We have reviewed the Modified Corrective Action Plan submitted January 9, 2004 by Trans-Jordan Cities (TJC). The plan is approved, with the stipulation that an update on the implementation and status of the plan be included in TJC's Solid Waste Facility Annual Report and whenever changes to or deviations from the plan are made. We appreciate your efforts in addressing this issue.

If you have any questions please call Ralph Bohn or Phil Burns at 801-538-6170.

Sincerely,

Dennis R. Downs, Executive Secretary

Utah Solid and Hazardous Waste Control Board

DRD/PEB/kk

c: Patti Pavey, M.S., Executive Director, Salt Lake Valley Health Department

TN200400066 Salt Lake County/Trans Jordan LF



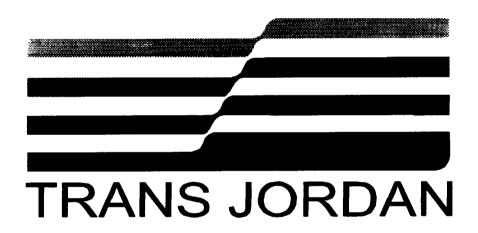
MODIFIED CORRECTIVE ACTION PLAN

(

Trans-Jordan Cities

FOR

TRANS-JORDAN LANDFILL



December 19, 2003

GENERAL MANAGER: DWAYNE J. WOOLLEY

ENGINEER: IGES, BRETT MICKELSON, P.E.

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Ground Water Elevations	
Modifications to the ground water recharge regime (by KUC), several years of be precipitation and increased demand on downgradient wells have all contributed to the diwater elevations, drying up 2 of T.J.I. monitor wells. The groundwater elevations in the todowngradient monitoring wells (MW-4 and MW-5) have dropped by over 1 foot in the last The following graphs illustrate the decreasing water levels for the last 4 years for monitoring wells. The bottom of each of the graphs corresponds to the bottom elevation of	rop in ground wo remaining ast 3 months reach of the
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TJC is in contact with KUC and discussing the potential of accessing adjacengroundwater sampling. If KUC grants access, TJC will analyze the water samwell for a list of constituents mutually agreeable to the State Department of Sci (DSHW), TJC and KUC.	npled from the production olid and Hazardous Waste

EXECUTIVE SUMMARY

General

Pursuant to Regulation R315-308-3 (1) V of the Solid Waste Permitting and Management Rules, Trans-Jordan Cities (TJC) solicited input from affected and /or interested parties with regard to potential Ground Water impacts from Trans-Jordan Landfill (TJL).

Public Comment

The public comment meeting was conducted as part of a larger public comment period where TJC solicited input from interested or affected parties. The public comment period ran from September 29, 2003 to October 29, 2003 as stated in the attached advertisement published in the local newspapers. The only comments received by TJC during the course of the public comment period were from Mr. Jonathan Cherry of Kennecott Utah Copper (KUC).

Response to Public Comment

On December 9, 2003, TJC issued a written response to the State of Utah DSHW, regarding all questions and comments received during the Public Comment Period. A copy of this letter and KUC comments are included as Attachment 1.

Changes to Plan

Based on comments received, review of recent and existing data, TJC sees no compelling reason to significantly modify the previously submitted plan. Comments from Attachment 1 are referenced where appropriate. Minor editorial changes have also been made to the original submitted Corrective Action Plan. These are updates that do not change the intent of the original plan.

TRANS-JORDAN LANDFILL GROUND WATER REVIEW

General

The TJL began operation in 1958 and is a cooperatively operated solid waste landfill operated by TJC. TJC was officially formed as a political subdivision of the State of Utah in 1986 to dispose of solid wastes generated in the southern half of Salt Lake County. TJC operates under an Interlocal Agreement between its' member cities (the Cities of Draper, Midvale, Murray, Riverton, Sandy, South Jordan, and West Jordan) with a combined population of 307,000 (2000 census). The TJL is overseen by a Board of Directors with each member city having one board position. Daily operations and management of the Landfill is coordinated by Mr. Dwayne J. Woolley, General Manager.

TJL in conjunction with South Valley Water Reclamation Facility (SVWRF) cooperatively fund the operation and maintenance of a wood products and green waste grinding facility established in 1996. SVWRF is the operator of this facility located immediately south and adjacent to the landfill.

During 1999, TJL constructed and placed on-line, a citizen drop-off facility at the landfill. The citizen drop-off facility is comprised of two areas, one area provides a safe area for citizen unloading of residential wastes, and a second area is used to separate Household Hazardous Waste (HHW) and recyclables from the waste stream. The HHW program is a joint operation with Salt Lake Valley Health Department (SLVHD).

The existing landfill facility is located on TJC owned land in Section 15 of Township 3 South, Range 2 West. The street address for the landfill is 10873 South 7200 West, South Jordan Utah.

Landfill access is provided from U-111 (old State Route 111) at the landfill site's northwest corner. TJL is located within the city of South Jordan and West Jordan city limits are approximately 1/2 mile northeast. The community of Herriman lies approximately 3 miles south-southeast and Copperton is 1.5 miles to the west. Drawing 1 (Attachment 2) shows the general arrangement of the TJL site.

Ground Water Monitoring Requirements

The State of Utah Department of Environmental Quality Division of Solid and Hazardous Waste (DSHW) in conjunction with (SLVHD) regulate the design, construction and operation of municipal solid waste (MSW) landfills in Salt Lake County. Section R315-308 of the State regulations and Health Regulation #1 of Salt Lake County stipulate requirements required for ground water monitoring at MSW facilities.

Detection Monitoring:

Each facility must have at least one upgradient well and two downgradient wells. During the first year of facility operation after the wells are installed, a minimum of eight independent samples from the upgradient and four independent samples from each downgradient well are analyzed for the constituents in Section R315-308-4 to establish

background water quality. The detection monitoring program requires the owner or operator of the facility to semiannually determine ground water quality at each monitoring well during the operation, closure and post-closure care period of the facility.

If, during the performance of the detection monitoring, a constituent is detected in the downgradient wells that has a statistically significant increase over the upgradient (background) water quality, the facility owner or operator must:

- Enter the information in the operating record of the facility.
- Notify the Executive Secretary (DSHW) and Director (SLVHD) of the findings.
- Immediately resample all wells to further evaluate the water quality.

If there is a statistically significant increase over background of any constituent, the owner or operator of the facility has 90 days to demonstrate that the source of the contamination is not associated with the facility. If the facility does not establish that the contamination is not associated with the facility, the ground water monitoring program moves into assessment monitoring.

Assessment Monitoring:

Assessment monitoring starts with sampling all downgradient wells and analyzing the water for all constituents listed in Appendix II of 40 CFR Part 258. For any constituent detected in the Appendix II list, a minimum of four independent samples must be collected, analyzed, and statistically analyzed to establish background concentrations. The owner or operator of the facility shall sample quarterly and compare the concentrations to ground water protection standards.

If after two consecutive sampling events, the concentrations of all constituents being analyzed are shown to be at or below established background values, the owner or operator must notify the Executive Secretary and upon approval return to detection monitoring.

If concentrations of any of the constituents are statistically measured at concentrations exceeding the protection standards, the owner or operator must notify the Executive Secretary, local health officials, and adjacent landowners, then characterize the nature and extent of the release. If the owner or operator cannot demonstrate that the source of the contamination is other than the landfill, then the facility enters into a corrective action phase.

Corrective Action:

As a facility enters into corrective action, the owner or operator of the facility takes any interim measures to protect human health and the environment and assesses possible corrective actions. Based upon the corrective action assessment and public comment, the

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owner or operator must select a remedy, which shall be submitted to the Executive Secretary.

Upon approval of the selected corrective action, the Executive Secretary will notify the owner or operator of such approval and will require that the corrective action plan proceed according to the approved schedule.

TJL Ground Water Monitoring Program

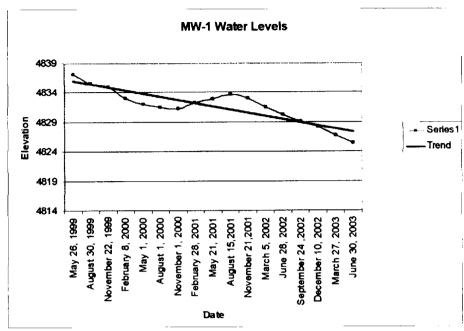
A ground water monitoring program was initiated in March of 1994 with the installation of monitor well one (MW-1). Water from MW-1 was compared with water well data in the vicinity of the landfill and it was determined that MW-1 was completed in a perched water system not representative of the documented low pH water known to be found in surrounding Kennecott Utah Copper (KUC) wells. As a result MW-1 has not been used as an upgradient well. Installation of monitor well two (MW-2) was performed in January of 1995 to serve as the upgradient monitor well for water quality evaluations. Monitor well three (MW-3) was installed in December of 1995 and served as the initial downgradient well for water quality evaluations.

Monitor well four (MW-4) was installed in November of 1997 to function as the second downgradient well. Monitor well five (MW-5) was installed in August of 1998 to monitor ground water closer to the active cell.

These sampling wells were originally located based on the predominant groundwater flow being west to east. However, down gradient pumping and the recent construction of a surface and alluvial cutoff system by KUC and other activities related to the Copper Mine located up gradient from the site, have each altered the groundwater conditions at the landfill. Drawing 2 (Attachment 2) shows the location of the five TJL monitoring wells.

Ground Water Elevations

Modifications to the ground water recharge regime (by KUC), several years of below average precipitation and increased demand on downgradient wells have all contributed to the drop in ground water elevations, drying up 2 of TJL monitor wells. The groundwater elevations in the two remaining downgradient monitoring wells (MW-4 and MW-5) have dropped by over 1 foot in the last 3 months. The following graphs illustrate the decreasing water levels for the last 4 years for each of the monitoring wells. The bottom of each of the graphs corresponds to the bottom elevation of each well:



Well #1 Data:

Well Depth = 365'

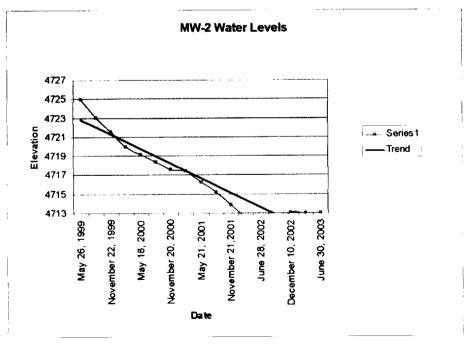
Bottom Elev. = 4814'

Initial Water Column = 39'

Water Column Remaining = 11'

Well #1 Status:

Not currently utilized for groundwater analysis.



Well #2 Data:

Total Depth = 455'

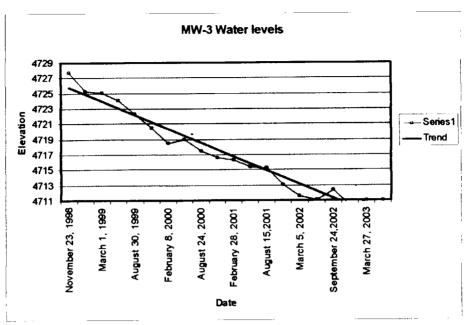
Bottom Elev. = 4713

Initial Water Column = 34.5'

Water Column Remaining = 0

Well #2 Status:

No viable sample since June 2002



Well #3 Data:

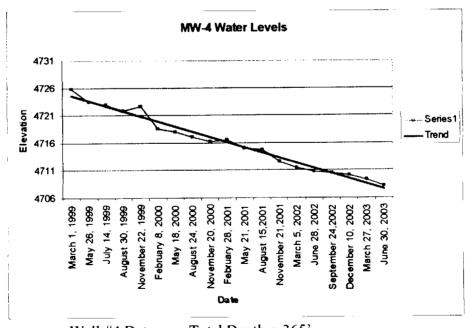
Total Depth = 319'

Bottom Elev. = 4711'

Initial Water Column = 30.5'

Water Column Remaining = 0

Well #3 Status: No viable sample since June of 2002



Well #4 Data:

Total Depth = 365',

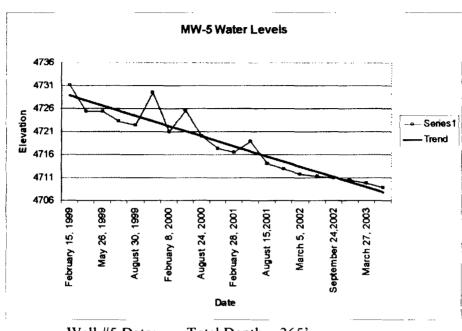
Bottom Elev. = 4706'

Initial Water Column = 22'

Water Column Remaining = 2'

Well #4 Status:

Operational (Projected date being dry: 1st quarter 2004)



Well #5 Data:

Total Depth = 365',

Bottom Elev. = 4706'

Initial Water Column = 21'

Water Column Remaining = 3'

Well #5 Status:

Operational (Projected date being dry: 1st quarter 2004)

Ground Water Quality

The most recent summary of the ground water quality at the TJL is presented in the 2002 Ground Water Monitoring Report, which was part of the annual landfill report submitted to DSHW in February of 2002. This Ground Water Monitoring Report presents the results of recent ground water analysis, including ground water chemistry, depth to water and the interpreted direction of ground water flow under the TJL. The "Trans-Jordan Landfill 2002 Ground Water Monitoring Report" is included as Attachment 3.

Potential Constituents of Concern

The 2002 Ground Water Monitoring Report details the procedures for analyzing the concentration of constituents in ground water. The ground water at TJL is analyzed for ground water constituents as prescribed by the DSHW regulations. Most of the chemicals analyzed for are either non-detect or are present at low enough concentrations to not exceed ground water standards. Statistical analysis is performed on all measurable constituents to determine if ground water is potentially being impacted from landfilling operations.

Potential Constituents of Concern for TJL are the following organic compounds:

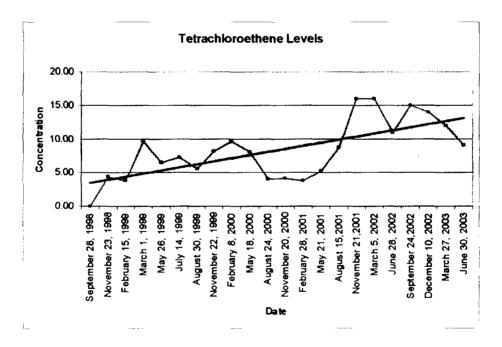
• 1,1 Dichloroethene

- Tetrachloroethene
- 1.1.1 Trichloroethane
- Trichloroflouromethane
- Dichlorodiflouromethane

Of the five potential constituents of concern listed above, four (1,1 Dichloroethene, 1,1,1 Trichloroethane, Trichloroflouromethane, and Dichlorodiflouromethane) have been measured in the ground water at TJL at concentrations lower than the ground water protection standards.

Only Tetrachloroethene in TJMW-5 was identified as a constituent of concern, which is identified as having concentrations higher than the groundwater protection standards and having higher concentrations downgradient than upgradient.

The following chart shows the concentration of Tetrachloroethene over time in well #5:



Confidence Interval analysis for Tetrachloroethene utilizing the data through March 2003 showed that Tetrachloroethene has exceeded the ground water protection standard of 5 parts per billion with all data subsets.

CORRECTIVE ACTION #1 - ACCELERATED CLOSURE OF UNLINED LANDFILL

General

Tetrachloroethene (PCE) is a dense non-aqueous phase liquid (DNAPL). One problem with the chlorinated solvents is that they are heavier than water and can result in deep

contamination. PCE can migrate under the influence of gravity as a liquid, or can volatize and migrate in a vapor phase. Due to the nature of PCE, depth to ground water, and the inherent challenges in investigating the source and mechanism of the PCE transport, TJC proposes to mitigate both of the primary mechanisms for transport.

The first of the corrective actions summarized in this plan will be to minimize the potential for liquid based solute transport by constructing a landfill cover system that will reduce the infiltration of liquid into the landfill. TJC has modified the landfilling operations to accelerate the closure of the unlined landfill. The active landfill face has been moved from the lined cells and located over the unlined landfill to bring the unlined area to a final grade sooner. Bringing the unlined landfill to grade sooner will allow for the installation of a synthetic cover over the top of the unlined area in the most time efficient manner and minimize the potential infiltration of water into the MSW. TJC has elected to incorporate synthetic materials for cover construction rather than a monolithic soil cover to improve methane collection, storm water management and infiltration reduction efforts. Reducing the infiltration of water in the landfill will minimize the generation of leachate which will reduce the potential for additional PCE transport in a liquid medium.

To accomplish the accelerated closure of the unlined landfill, while maintaining a manageable landfill operation, TJC has developed a phased closure plan for the entire landfill operation. The following presents the scheduled closure phases at the Landfill:

Side Slopes Closure

Drawing 3 (Attachment 2) indicates the areas of the landfill to be covered with a minimum of 5 feet of acceptable soil cover. Drawing 3 also shows the locations that test pits have been excavated to document soil depth and the locations of future test pits. Once final cover soils have been placed on the remaining side slopes, test pits will be excavated to document the remaining side slopes soil thickness. All side slopes will have received final cover by late fall of 2003. The side slopes indicated on the drawing are slopes that in general bound the unlined areas of the landfill.

TJL has accelerated the side slope closure, as previously discussed with DSHW personnel, to aid in the implementation of the first corrective action. All side slopes will receive a minimum of 5 feet of site soils. All test pits excavated to date showed the minimum 5-foot cover thickness. Once test pits are excavated in the remaining areas to document cover thickness, topsoil and/or compost will be placed on all side slopes and the areas revegetated.

All areas of the landfill will be closed in accordance with applicable final cover requirements in the regulations.

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Closure Phases A through H

Phases A through H as indicated on Drawings 4, 5, 6, and 7 (Attachment 2) represent the future closure phases of the landfill. The cover system utilized in Phases A through H will incorporate synthetic materials designed to the lower liner permeability criteria of the lined cells. The utilization of synthetic materials in the cover design will aid in the design and operation of a future landfill gas recovery system.

The approximate closure schedule and associated area for each Phase is as follows:

Phase	Cover Area	Date of Closure
North side slopes	26 acres	Summer 2003
Phase A	11 acres	Summer 2004
Phase B	7 acres	Summer 2005
Phase C	10 acres	Summer 2007
Phase D	15 acres	Summer 2011
Phase E	17.5 acres	Summer 2016
Phase F	18.5 acres	Summer 2021
Phase H	30.5 acres	Summer 2030

Duration of Corrective Action #1

All landfill covers will be maintained from initial installations through the closure, and through the post-closure care periods.

CORRECTIVE ACTION #2 - INSTALLATION OF A GAS COLLECTION SYSTEM

General

The second of the corrective actions summarized in this plan will be to install a landfill gas collection system that will depressurize the landfill while recovering methane, thus minimizing the potential for a vapor phase transport of the PCE.

The installation of a gas recovery system is part of a comprehensive waste management plan that is being implemented at the landfill. Installation of the system allows for the safe, long-term methane management that will help to minimize the potential for further environmental impacts to the ground water.

Existing Gas Recovery Design

As part of the New Source Review program of the State of Utah Division of Air Quality, TJC had a methane collection system designed. The design of the methane collection system met the requirements of the Air Quality Regulations and, at the time of the design, represented the anticipated closure sequence of the landfill.

The existing gas collection system design was prepared by HDR Engineering, Inc. in 1999 and had provisions for some 45 vertical wells uniformly distributed across the landfill. The design package included all requisite engineering details and specifications to support a bid package.

Gas to Energy Project

TJC is negotiating a final contract to partner with a developer in support of a Landfill Gas-to-Energy Project (LGEP). The LGEP is a proactive partnership in the beneficial use of landfill gas.

The contract is a culmination of a RFP process where TJC received 6 competitive proposals in April of 2003. Trans-Jordan personnel reviewed and ranked all 6 proposals based upon landfill gas-to-energy experience, project approach, schedule and proposed fee. Out of the 6 proposals, 3 were selected to prepare presentations to Trans-Jordan's personnel. The 3 remaining bidders were given additional information reflecting the change in closure sequence and additional site-specific data. Final presentations to TJC were conducted the 21st of August 2003. As this contract is finalized, TJC will proceed with the LGEP early next year.

TJL will install a gas collection system as part of its methane management plan, but with the price of natural gas steadily increasing, the prospects of a viable gas-to-energy project increase substantially.

System Construction

The construction of any gas collection system or gas-to-energy system will be of a phased nature. The system will be installed concurrent with or just subsequent to the closure of each of the Phases outlined previously.

Duration of Corrective Action #2

Landfill gas will be continually collected from the initial system installation through closure and post-closure care periods or until landfill gas is measured below 25% of the LEL for Methane in the system.

CORRECTIVE ACTION #3 – KUC GROUND WATER RECOVERY SYSTEM

General

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The third and final portion of the proposed corrective actions summarized in this plan is a ground water recovery system being implemented by KUC. Though KUC is responsible for the aspects of their ground water recovery program, TJC appears to be an indirect beneficiary of KUC's actions. KUC actions, independent of the Corrective Actions #2 and #3 may mitigate TJL impact to the ground water.

Geologic Background

The TJL is located in the southwestern portion of the Jordan River Valley, usually called the Salt Lake Valley, east of the northern Oquirrh Range and the mouth of Bingham Canyon. Bingham Creek flows from the Oquirrh Range eastward down Bingham Creek (immediately north of the landfill) and out into the Salt Lake Valley to the Jordan River. West of the landfill area are the mining operations of the Bingham Canyon Mine that is located at the confluence of Bingham and Carr Fork Canyons. The Bingham Mining District has been developed in intrusive and meta-sedimentary rocks.

KUC Ground Water Impacts

Kennecott Utah Copper has been conducting mining operations west of the landfill location for decades. As part of the mining operations, a reservoir (Bingham Canyon Reservoir) has been operated in the Bingham Creek drainage to serve as storage for process waters. The reservoir is located hydraulically upgradient from the TJL, approximately 8,900 feet to the west. Seepage losses from the historic operation of the Bingham Creek Reservoir have been estimated at over 1,000,000 gallons per day since construction in 1965. The Bingham Creek Reservoir (unlined) has since been decommissioned and replaced with a lined reservoir, but the residual downgradient acid. and sulfate waters still remain. Additionally, KUC has installed several groundwater cutoff walls.

The affected ground waters have been estimated to extend over 20,000 feet downgradient to the east and about 10,000 feet wide, fully encompassing the landfill. The sulfate concentration in some of the monitor wells within the plume has historically exceeded 50,000 mg/l with some pH values less than 3.0.

Previous hydrogeologic work has delineated a 10,000 mg/l TDS contour line running beneath the landfill. The wide range in TDS concentrations in the study area reflects the impact of historic mining operations on the groundwater.

KUC Ground Water Treatment

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KUC has been working with the State of Utah Division of Water Quality for several years to implement a groundwater recovery and treatment plan. KUC's recovery effort involves pumping impacted groundwater from a network of wells designed and installed to recover both the low pH water and the high TDS waters. "The Southwest Jordan Valley Ground Water Cleanup Project" is currently undergoing a public comment period while preliminary work has already been started. A new acid recovery well has been installed within 200 feet of the TJL boundary. The volume of water pumped from this well and others located near the landfill will drastically alter the groundwater elevations under the landfill. KUC has shared information on two of the possible pumping scenarios.

Scenario #1 pumping rates:	Scenario #2 pumping rates:
Zone A:	Zone A:
Acid Well 1146 (950 gpm)	Acid Well 1146 (950 gpm)
New Acid Well (750gpm)	New Acid Well (750gpm)
Jordan Wells (2600 acre feet/yr)	W. Jordan Wells (2600 acre feet/yr)
Lark Well (200 gpm)	Lark Well (200 gpm)
Sulfate Well (1000 gpm)	Sulfate Well (1000 gpm)
Sulfate Well B2G1193 (1100gpm)	Sulfate Well B2G1193 (1700gpm)
Sulfate Well B2G1200 (1100gpm)	Sulfate Well B2G1200 (1700gpm)
Riverton Wells (4308 acre feet/yr)	Riverton Wells (4308 acre feet/yr)
Zone B:	Zone B:
Wells 1-6 (235gpm each)	Wells 1-6 (235gpm each)
Well 7 (1200 gpm)	Well 7 (1200 gpm)

10, 20, and 40 Year Drawdowns

KUC's drawdown data for each of the above scenarios is presented on Drawings 8, 9, 10, 11, 12 and 13 (Attachment 2). Drawings 8, 9, and 10 represent the predicted groundwater drawdown for scenario #1 at 10, 20, and 40 years. Drawings 11, 12, and 13 represent the predicted groundwater drawdown for scenario #2 for the same 10, 20, and 40 year periods.

The predicted 10-year groundwater drawdown for the groundwater in the vicinity of the landfill ranges from 30 to 60 feet. The predicted 20 and 40-year groundwater drawdowns for the landfill areas are from 50 to 80 feet and 70 to 90 feet respectively.

KUC Water Destinations

Water from the acid wells will be directed to the KUC tailings ponds north of Magna and water recovered from wells B2G1193 and BFG1200 will be sent to a reverse osmosis plant for treatment to drinking water standards for public use.

Duration of Corrective Action #3

The duration of the KUC recovery actions is scheduled for the next 40 years. When the groundwater under TJL has reached equilibrium, groundwater will be sampled and analyzed to document that the Corrective Action was successful.

FUTURE GROUND WATER MONITORING

Impacts to Trans-Jordan Landfill's Ground Water Monitoring

As previously detailed, the groundwater under the landfill is dropping. Two of the five monitoring wells are now dry and the two remaining downgradient wells are anticipated to become dry within 9 months. The predicted drop of ground water and subsequent drying out of MW-4 and MW-5 does not include an increase in the rate of ground water drop due to the upcoming pumping plan. If water recovery efforts start soon, the entire groundwater monitoring system at the landfill may be rendered useless.

New Well Installation

These two pumping scenarios may not be the only variations in a KUC plan, but are only the scenarios shared with TJC. The impacts to the groundwater elevations under and surrounding the landfill might be enormous. Based upon the magnitude of the groundwater elevation change, the level of accuracy of the modeling, and the numerous scenarios being considered, the true impact to the groundwater elevations are still unknown.

The anticipated drawdown of the ground water surface may result in the change of direction of flow of the groundwater under the landfill. The effects of the change in direction of flow are also an unknown.

The magnitude of these unknowns (final depth to groundwater and final direction of flow) are such that the location selection for and the installation of a new monitor well is extraordinarily difficult. Without knowing the steady state conditions associated with the remediation efforts, the installation of a new well will have a low likelihood of providing useful water quality data. As a result, TJC proposes to not install a new groundwater monitoring well.

Once the ground water regime stabilizes, TJC will assess the long-term ground water monitoring requirements of the landfill and install monitoring wells if deemed necessary.

Proposed Ground Water Monitoring

TJC is in contact with KUC and discussing the potential of accessing adjacent KUC wells for potential groundwater sampling. If KUC grants access, TJC will analyze the water sampled from the production well for a list of constituents mutually agreeable to the State Department of Solid and Hazardous Waste (DSHW), TJC and KUC.

Attachment 1



December 9, 2003

10873 S 7200 West P.O. Box 95610 South Jordan, UT 84095-0610

(801) 569-8994 (O) (801) 352-0578 (F)

landfill a gwest net www.transjordan.state.ut.u.-

Dwayne J. Woolley

Mr. Dennis R. Downs, Director Utah Division of Solid and Hazardous Waste Department of Environmental Quality State of Utah 288 North 1460 West P.O. Box 144880 Salt Lake City, Utah 84114-4880

General Manager

RE: Response to Public Comments on Trans-Jordan Cities Corrective Action Plan

Dear Mr. Downs,

MEMBER CITIES

MIDVALE

MURRAY

RIVERTON

SANDY

SOUTH JORDAN

WEST JORDAN

Recycled Paper

Trans-Jordan Cities (TJC), as required by R315-308-3 (1) V of the Solid Waste Permitting and Management Rules has advertised for and conducted a public meeting on October 22, 2003. The public comment meeting was conducted as part of a larger public comment period where TJC solicited input from interested or affected parties. The public comment period ran from September 29, 2003 to October 29, 2003 as stated in the attached (Attachment 1) advertisement published in the local newspapers. The only comments received by TJC during the course of the public comment period were from Mr. Jonathan Cherry of Kennecott Utah Copper (KUC). These comments are included as Attachment 2 of this document.

KUC had one general comment and five specific comments with regard to the TJC corrective action. The following statements are issued in response to items mentioned in the KUC:

General Comment Response - TJC agrees with KUC that "the lining of current and future cells, along with reclamation as planned in the planned work approach, should provide better control for contaminant migration from the TJL property."

However, at the current time, monitoring of the ground water under the Trans-Jordan Landfill (Landfill) is problematic at best. The ground water levels under the Landfill have dropped over 40 feet since the installation of the first monitor well. Additionally, the apparent direction of the ground water flow has also changed significantly since the inception of the ground water monitoring program. The magnitude of the changes to the historic ground water regime under the landfill are significantly less that the magnitude of the upcoming ground water changes induced by the proposed KUC "Southwest Jordan Valley Ground Water Cleanup Project (KUC Project)".

The ground water regime under the Landfill will be in a state of flux for quite some time. Until the effects of KUC Project are documented and future trends established, TJC can not accurately locate monitoring wells. The location of monitoring wells is paramount in the establishment of a representative ground water monitoring program. At this time, not only is the horizontal locating of monitoring wells not feasible, the actual depth of the screened intervals for each well would be only a rough estimate.



<u>Comment #1 – The accurate characterization of the lateral and vertical extent of Tetrachloroethene (PCE)</u> migration is not feasible due to the type of soil, the depth to ground water at the Landfill, and the operational nature of landfilling

TJC has investigated the potential of sampling the KUC wells proximate to the landfill. These wells do not have screened intervals that would facilitate this sampling as their screened intervals are not consistent with TJC's spacing. As the effects of the KUC Project become known, some of these wells may be useful for ground water sampling for PCE at some point in the future.

As stated in the previous response, the ground water regime under and surrounding the landfill will be in a state of flux for the foreseeable future. The beneficial placement of monitor wells in this circumstance is not likely. Once the ground water regime stabilizes, TJC will assess the long term ground water monitoring requirements of the landfill and install monitoring wells if deemed necessary.

TJC agrees with KUC that "the actions under Corrective Action #1 should mitigate future releases"

Comment #2 – As part of the first phase of closure, a methane collection system will be installed under the final cover. The methane collection system will also serve as the first part of a landfill gas-to-energy system utilizing the methane generated by the Landfill for a productive beneficial /commercial use. The Landfill methane collection system is currently under design, with the depth of vertical wells being terminated within the waste. Vertical wells are designed to place the waste under a negative pressure. Typically, the vertical wells will be terminated 20' to 30' above a landfill liner. In areas of the landfill that are unlined, wells may extend down to original ground surface, but no further.

It is the intent of the landfill gas collection system design to initially induce a negative pressure within the waste with this negative pressure gradually extending to the soils under the landfill.

<u>Comment #3 – TJC</u> will negotiate with KUC to have appropriate well access and to sample the discharge of the new extraction well for organics. TJC will analyze the water sampled from the production well for a list of constituents mutually agreeable to the State Department of Solid and Hazardous Waste (DSHW), TJC and KUC.

<u>Comment #4 – Once</u> the ground water regime stabilizes, TJC will assess the long term ground water monitoring requirements for the landfill. TJC agrees with KUC in that the "Site hydrology information needs to be better understood". TJC will work in conjunction with KUC and the DSHW personnel to review the ground water data in an effort to better understand the subsurface water regime and to assess the potential location of future monitoring well(s) if deemed necessary.

<u>Comment #5 –</u> A situation where organic contaminated waters from under the Landfill being transported to the future RO plant and causing membrane compaction is hypothetical. Several events need to come to fruition for this scenario to exist.

The direction of ground water flow under the Landfill is changing and the future direction is not known at this time. As the effects of the KUC Project become evident, TJC will assess the movement of groundwater beneath the Landfill. If, during this review, it becomes evident (or is suspected) that waters from beneath the Landfill may be migrating towards the wells in question, TJC will install monitoring well(s) as appropriate to monitor the ground water between the Landfill and the RO wells. The location of any potential monitoring well(s) will be reviewed by DSHW and discussed with KUC personnel. Any monitoring well(s) installed would be sampled and analyzed for a mutually agreed list of constituents.

If organics are found to be present in the well(s), TJC will perform a study to determine the potential effects on the RO filters due to the presence of the organics. Since the actual organic fouling (vs scale &/or bio fouling) of any RO filter depends not only on the specific organic(s) present, but also on the concentrations of each of the organic(s), the evaluation of RO filter clogging at this time is premature and speculative at best.

Trans-Jordan is committed to the environmentally responsible operation of a municipal solid waste facility in harmony with both the word and the spirit of the Solid Waste Permitting and Management Rules.

If you have any questions, please call at your earliest convenience.

Respectfully submitted,

Dwayne J. Woolley

General Manager

Cc: Tom DeSpain, Chairman, Trans-Jordan Cities Board

Salt Lake Valley Health Department - Attn: Mary Pat Buckman

Brett Mickelson, P.E., IGES

ATTACHMEN?

NOTICE

Trans-Jordan Cities has submitted to the Division of Solid and Hazardous Waste a Corrective Action Plan "Plan" in regard to their Class I municipal landfill located approximately 1.5 miles east of Copperton along Highway 111 in South Jordan City (10873 S 7200 West). The Plan has been reviewed by the Division of Solid and Hazardous Waste and has been found to be acceptable to go to public comment. The public comment period on this Plan begins September 29, 2003 and will end October 29, 2003. A public information meeting will be held on October 22 at 6:00 p.m. in the Community Room at Fire Station 2, located at 4022 W 10400 South, South Jordan

Copies of the Plan are available for public review during the comment period during normal business hours at the following locations

Trans-Jordan Landfill office 10873 S. 7200 West South Jordan UT 84095

Utah Department of Environmental Quality 288 North 1460 West, 4th Floor Salt Lake City, Utah

They also can be viewed on the Internet at the walk narrandonswaste main got the comments of t

Written comments will be accepted if received by 5:00 PM on October 29, 2003 and should be submitted to.

Dwayne Woolley, General Manager Trans-Jordan Cities 10873 S 7200 West PO Box 95610 South Jordan UT 84095-0610

Comments can also be sent by electronic mail to <u>a real lead west are</u>. Comments sent in electronic format should be identified by putting the following in the subject line public comment on Plan. All documents included in comments should be submitted as ASCII (text) files.

For further information contact Dwayne Woolley of Trans-Jordan Cities at (801) 569-8994, or Brett Mickelson, P.E., of IGES, Inc., at (435) 649-7344.

Posted in both the Morning Descret News and Salt Lake Tribune on September 21 & 28, 2003

Jonathan C Cherry, P E Senior Project Engineer P O Box 6001 Magna, Utah 84044 Phone: 801-569-7128 Fax: 801-569-7192

Email cherry@kennecott.com



October 29, 2003

Mr. Dwayne Woolley General Manager Trans-Jordan Cities 10873 South 7200 West PO Box 95610 South Jordan, Utah 84095-0610

Re Public Comment on Corrective Action Plan

Dear Dwavne

Kennecott Utah Copper Corporation (KUCC) has read the Corrective Action Plan (CAP) for the Class I municipal landfill, Trans-Jordan Landfill (TJL), located approximately 1.5 miles east of Copperton. Utah and submits the following comments per the request for public comments

General Comment - TJL has been in operation since 1958 and began as an unlined facility. Beginning in the late 1990s, TJL has been constructing fined cells. TJL is approximately 185 acres in size and approximately one-half of the area will contain lined cells and the other half, which is filled and partially reclaimed, was not lined Concentrations of contaminants, specifically. Fetrachloroethene (PCE), have been identified in several of the TJL monitoring wells within and downgradient of the TJL at concentrations higher than the groundwater protection standards and are the focus of the CAP KUCC acknowledges that it also has affected the groundwater beneath the south and west portions of TJL with inorganic contaminants containing greater than 10,000 mg/L. Total Dissolved Solids (TDS) and KUCC has begun an extensive groundwater water cleanup program to address this affected area. The lining of the current and future cells, along with reclamation as planned in the phased work approach, should provide better control for contaminant migration from the TJL property. However, any organic contaminants generated from the landfill and the downgradient migration of these contaminants should be monitored.

KUCC has two production wells located approximately one-half mile east and downgradient of LH, and these wells provide the groundwater feed for a reverse osmosis (RO) plant. The RO Plant will provide public drinking water as required under a 1995 EPA UDEQ Consent Decree and under the EPA UDEQ approved Final Design completed in 2002. The RO Plant has been designed to remove contaminants related to

Mr. Dwayne Woolley October 29, 2003 Page 2 of 3

mining operations, however it is not designed to remove organic contaminants. With this information in mind, the following specific comments are provided

- Since PCE has been detected in several of the monitoring wells and specifically in Well TJMW-5, KUCC believes that additional monitoring should be conducted. This would include the installation of several downgradient wells to monitor shallow and deep portions of the aquifer. PCE, which is denser than water, will migrate by gravity as a liquid or it may volatize and migrate as a dense vapor. Perched water zones beneath the landfill could be fed by lateral migration of meteoric water and thereby mobilize contaminates. Any PCE, which is currently residing in the unsaturated or saturated aquifer below TJL or downgradient of TJL should be investigated and the distribution of PCE should be delineated as much as can be feasible. Based upon the size of the site and the limited monitoring points sampled by TJL, the PCE distribution is relatively unknown. KUCC can also provide access to its relevant wells adjacent to the TJL site for sampling purposes. The actions under Corrective Action =1 should mitigate future releases.
- 2 Under Corrective Action #2, KUCC would like to know the projected depths of recovery for the gas recovery system and if the methane extraction will be by positive or negative pressure. The thickness of unsaturated aquifer exceeds 300 ft below most of the TJL surface.
- Junder Corrective Action #3, "KUC actions, independent of the Corrective Actions #2 and #3 may mitigate TJL impact to the ground water" KUCCs planned water recovery would refer to a new well located 200 feet south of the south edge of the landfill boundary and this well may extract contaminates generated from the landfill. Organic contaminates concentrations related to TJL should be monitored in the new extraction well. The new extraction well may not intercept contaminates originating from the northern and eastern portions of the landfill. Also, the concentrations of PCE or other TJL contaminants, if extracted by the new extraction well, will need to be within any permit or water quality standards because this water will be discharged into KUCCs process water system.
- 4 Even though the water levels are dropping beneath the TJL site, TJL should be required to monitor water quality. This would include optimum location sites downgradient of TJL combined with the use of KUCC monitoring well locations. Site hydrology information needs to be better understood and can be evaluated jointly by KUCC, TJL and the Utah Division of Solid and Hazardous Waste.
- 5 If the organic contamination continues to migrate to the east, northeast it will eventually be captured in KUCC's sulfate extraction wells that will be used as feed water for the Zone A RO plant. If PCE and other chlorinated organic compounds enter the RO plant, they will damage the membrane support layer and thereby will lead to irreversible membrane compaction. Therefore migration of

Mr Dwayne Woolley October 29, 2003 Page 3 of 3

> these compounds to any well that might provide feed water to the RO plant has to be prevented or the water will require pretreatment before membrane filtration

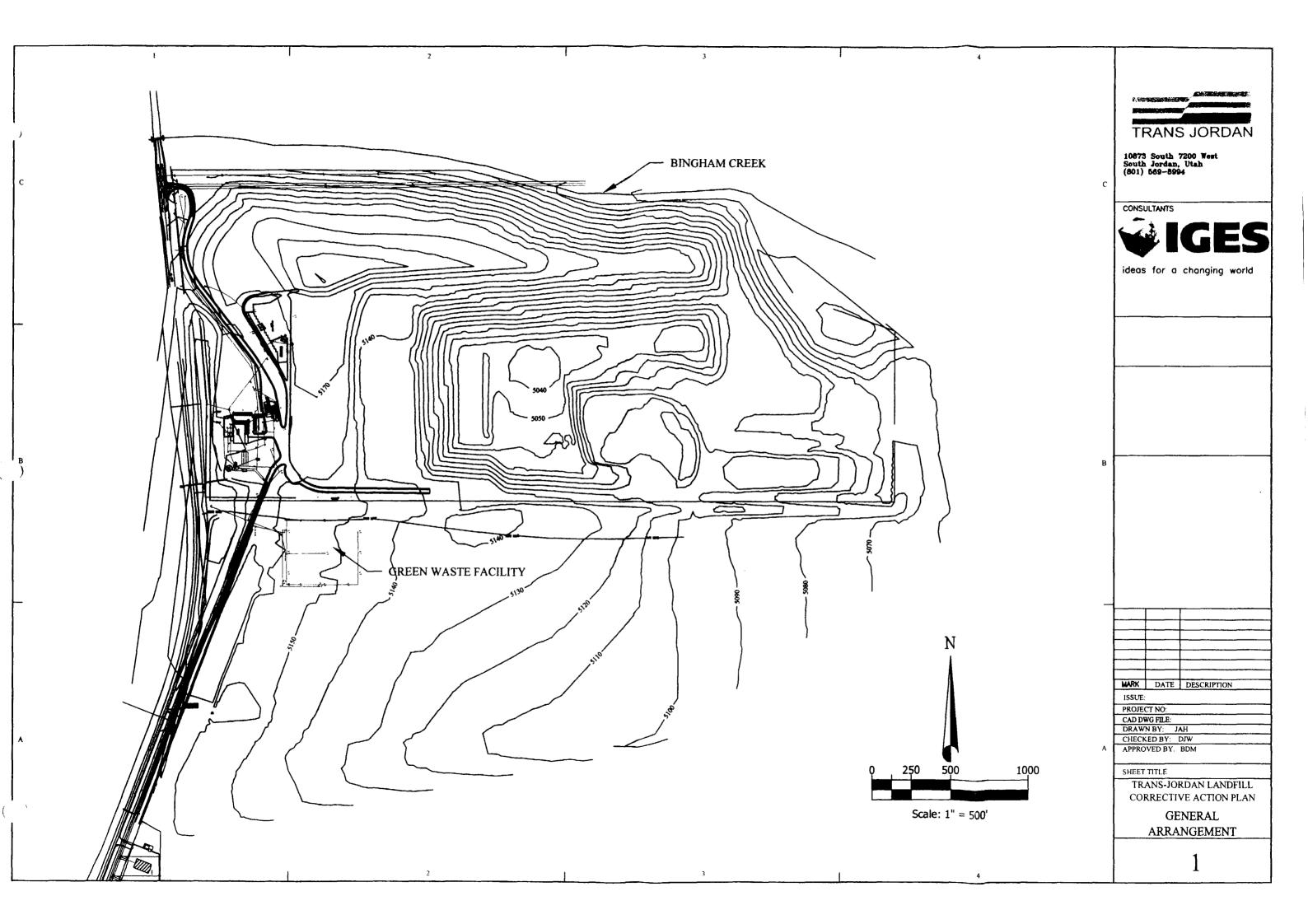
KUCC appreciates the opportunity to provide comments on the CAP for the TJL facility and look forward to your reply.

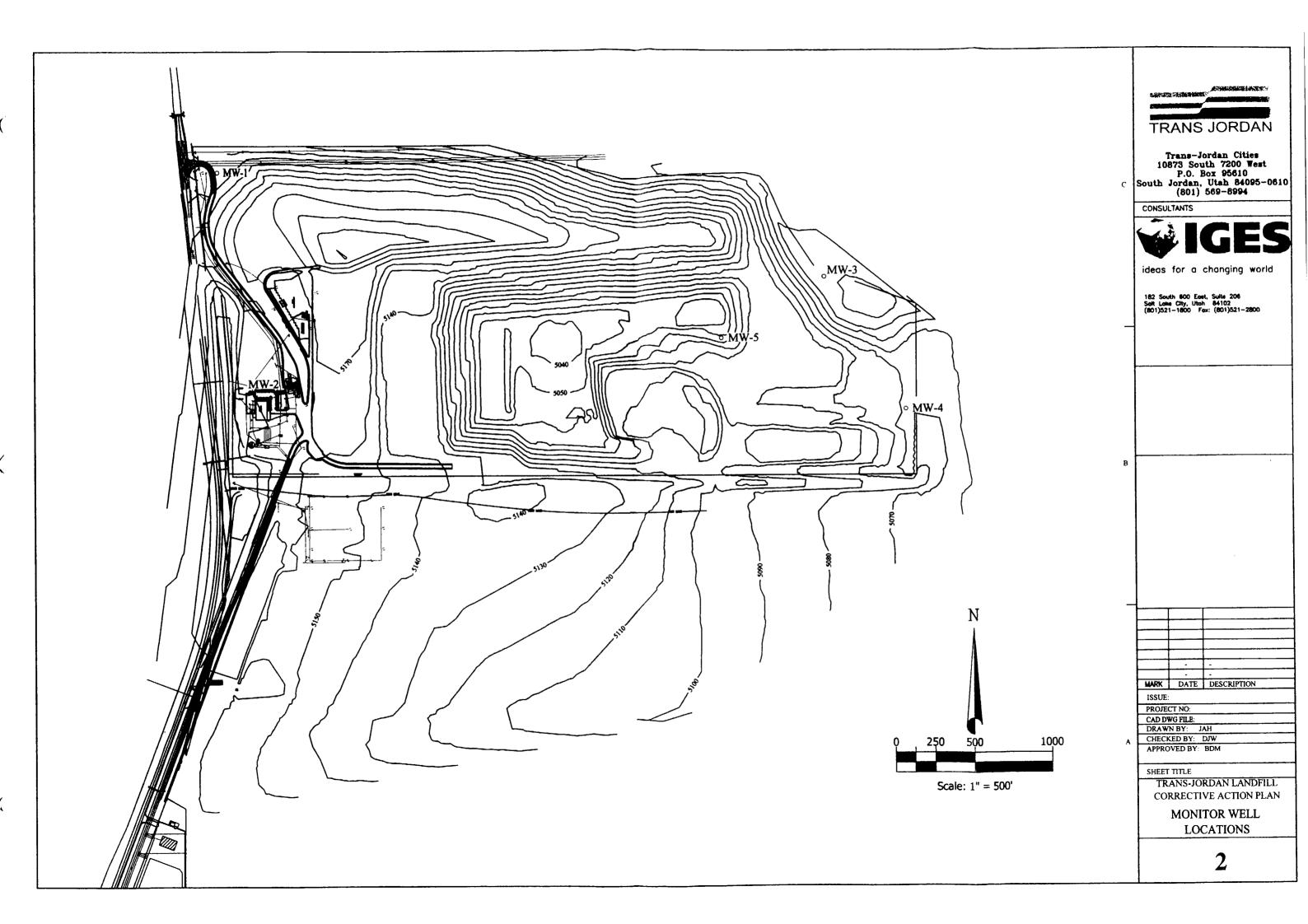
Sincerely,

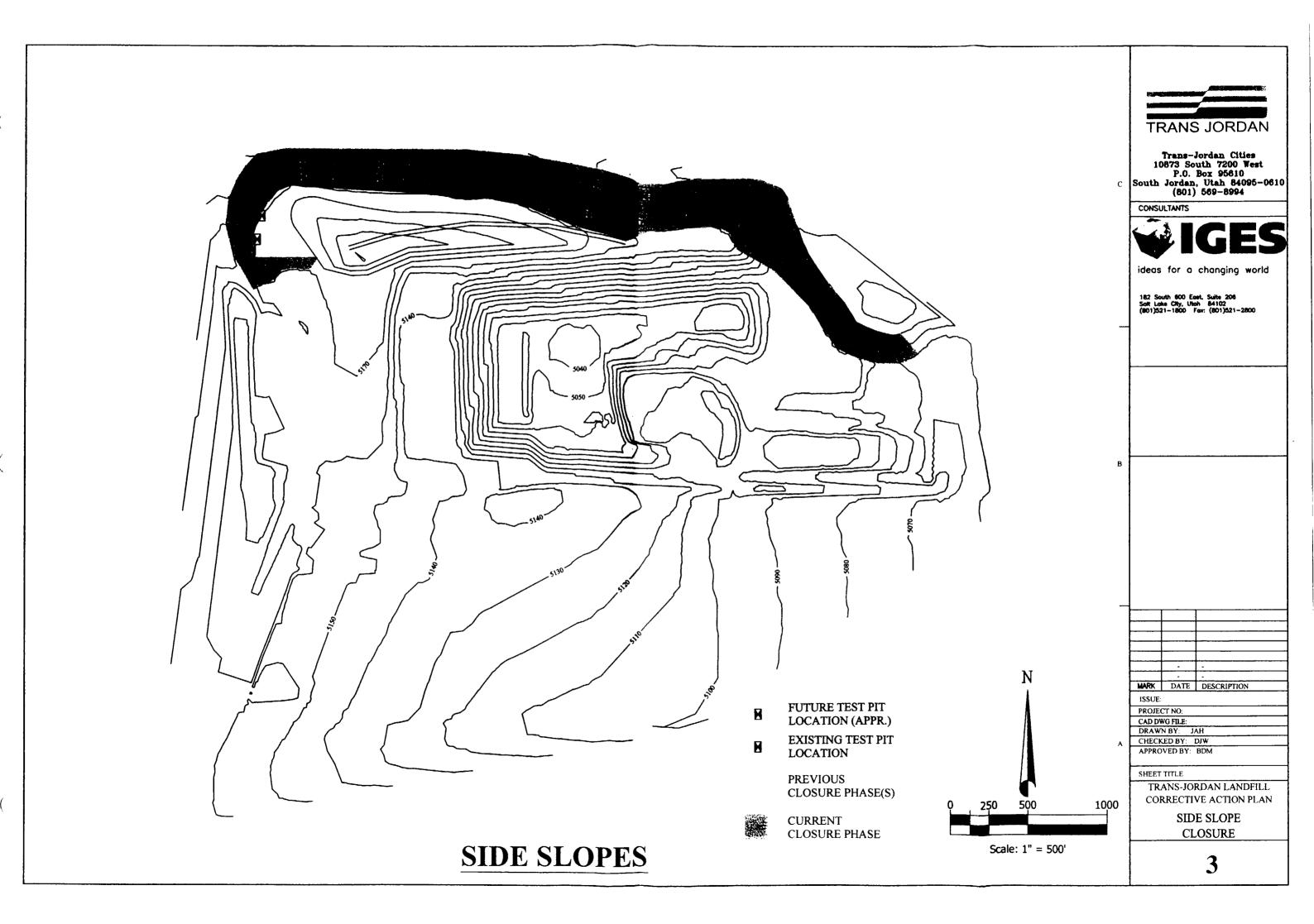
Jon Cherry, PE Senior Project Engineer Kennecott Utah Copper Corporation

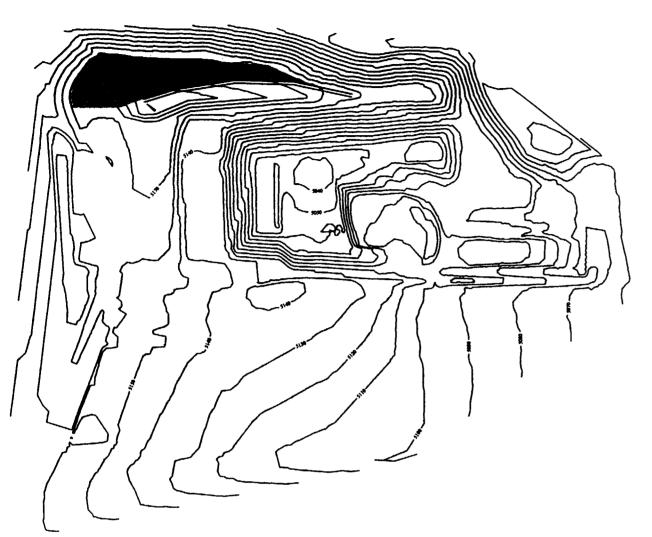
Cc Paula Doughty (KUCC)

Attachment 2





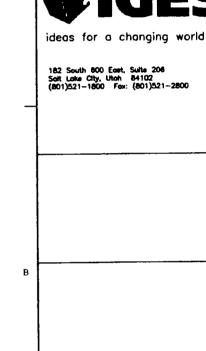




PHASE A

PREVIOUS CLOSURE PHASE(S)





CONSULTANTS

TRANS JORDAN

Trans-Jordan Cities 10873 South 7200 West P.O. Box 95610 South Jordan, Utah 84095-0610 (801) 569-8994

1600 PHASE B

TRANS-JORDAN LANDFILL CORRECTIVE ACTION PLAN

Scale: 1" = 800'

CLOSURE PHASES A & B

MARK DATE DESCRIPTION

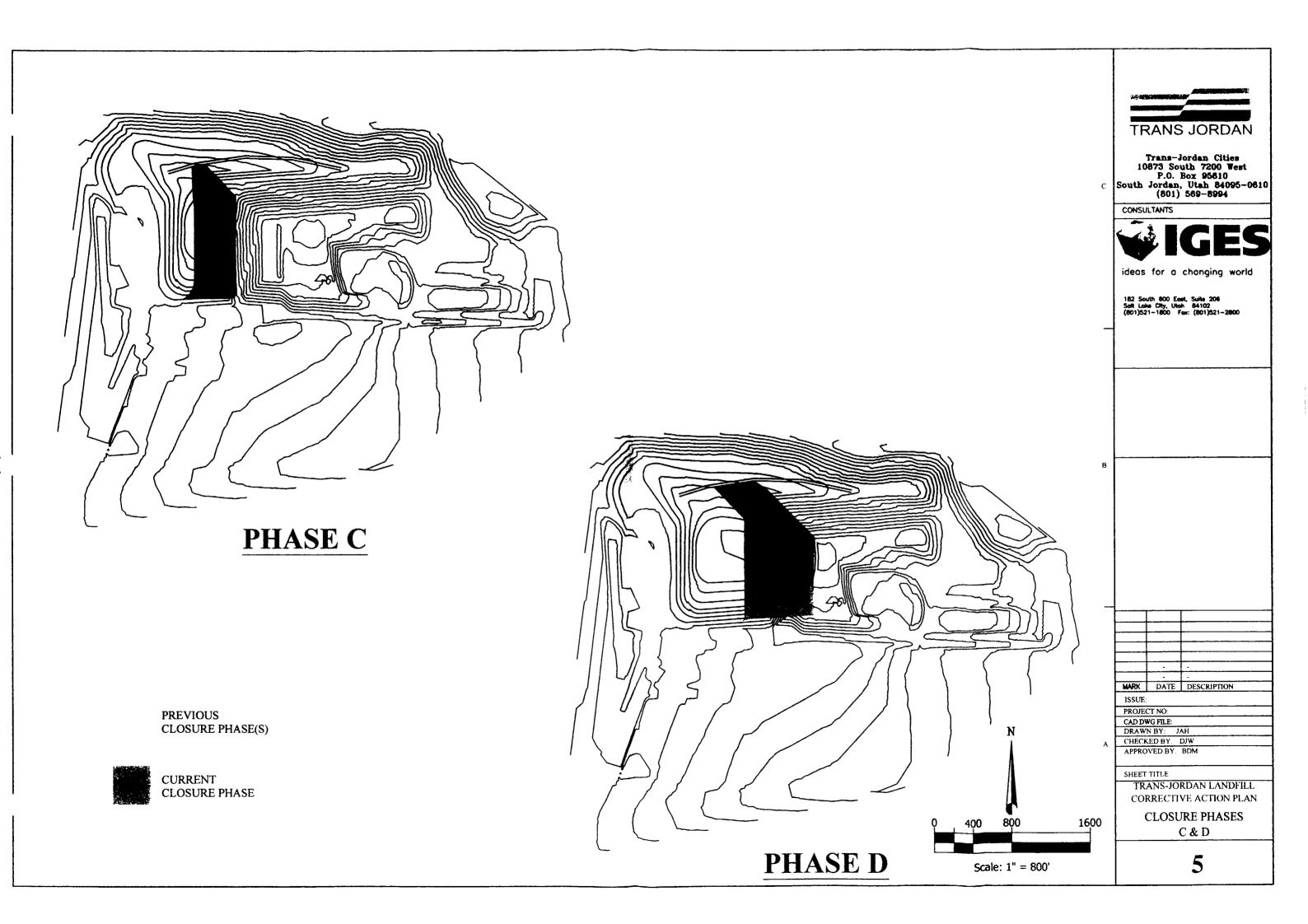
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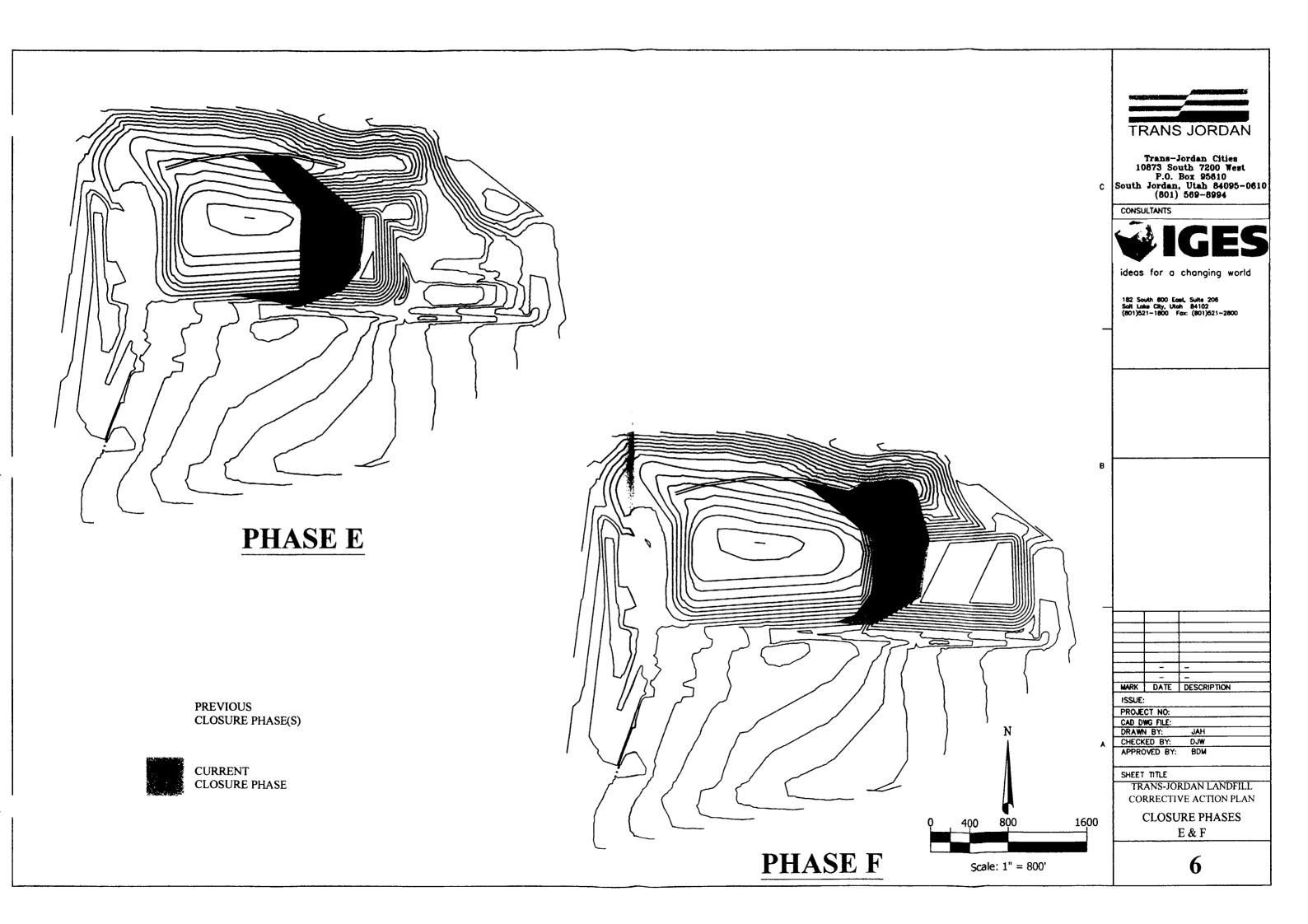
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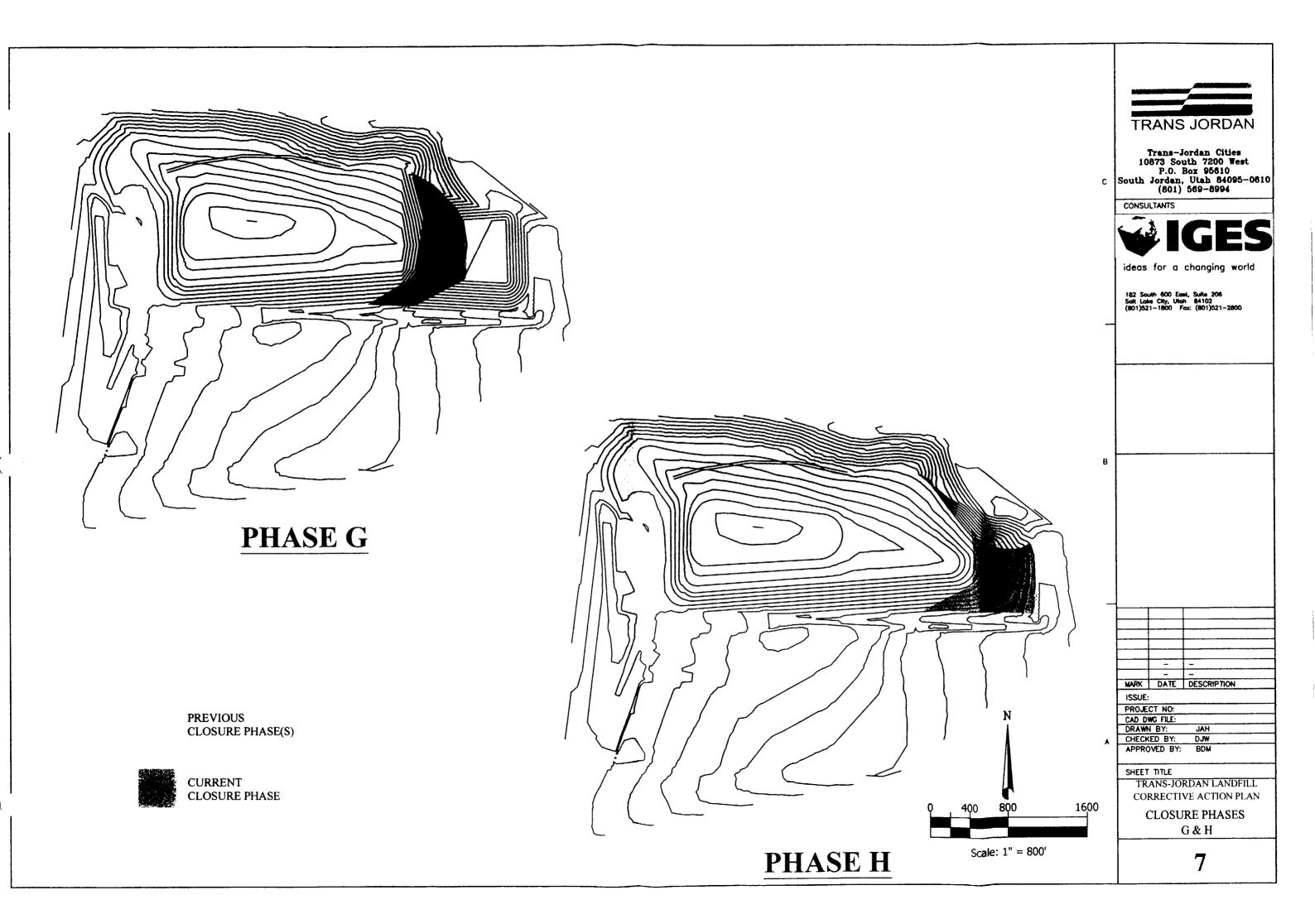
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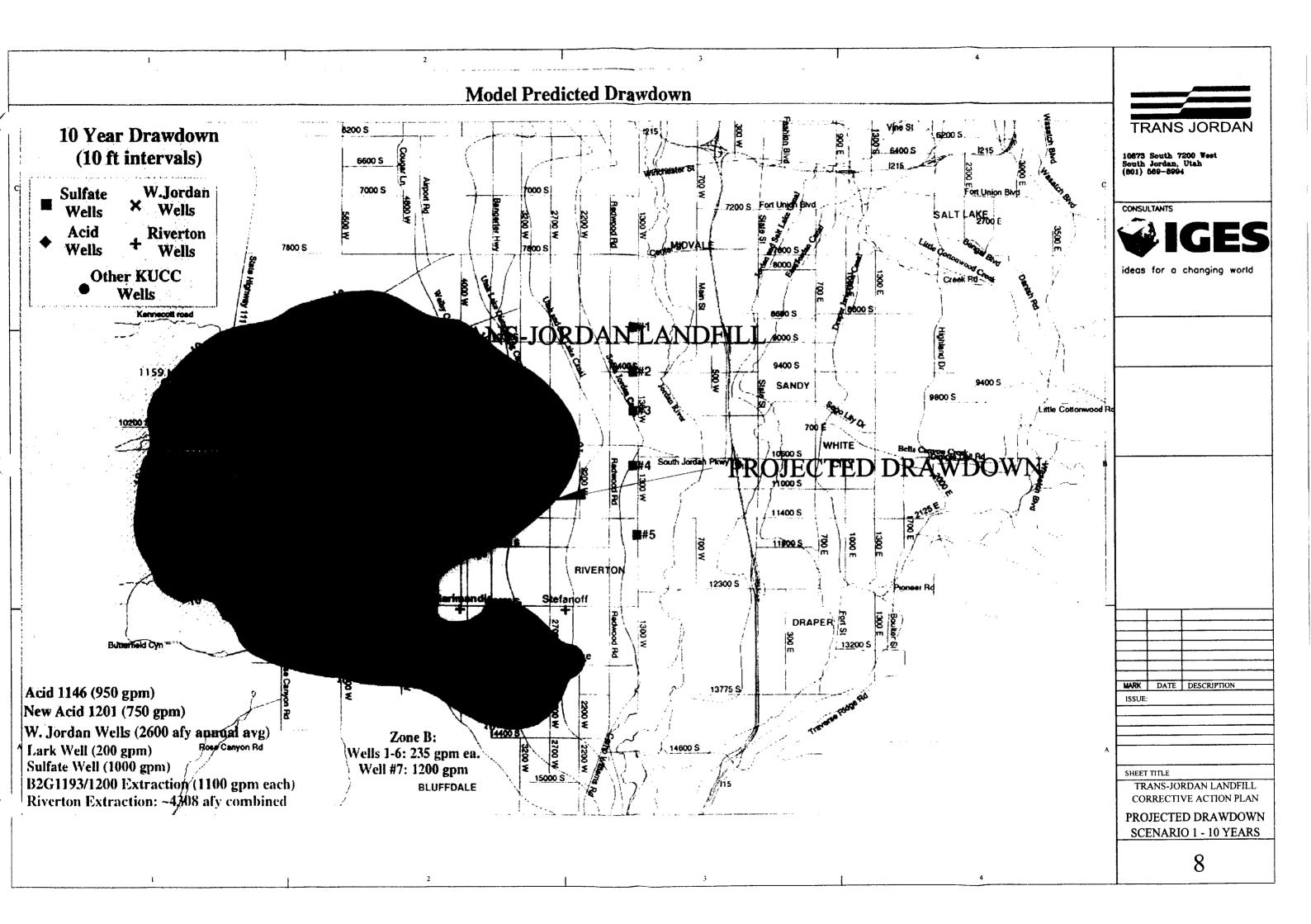
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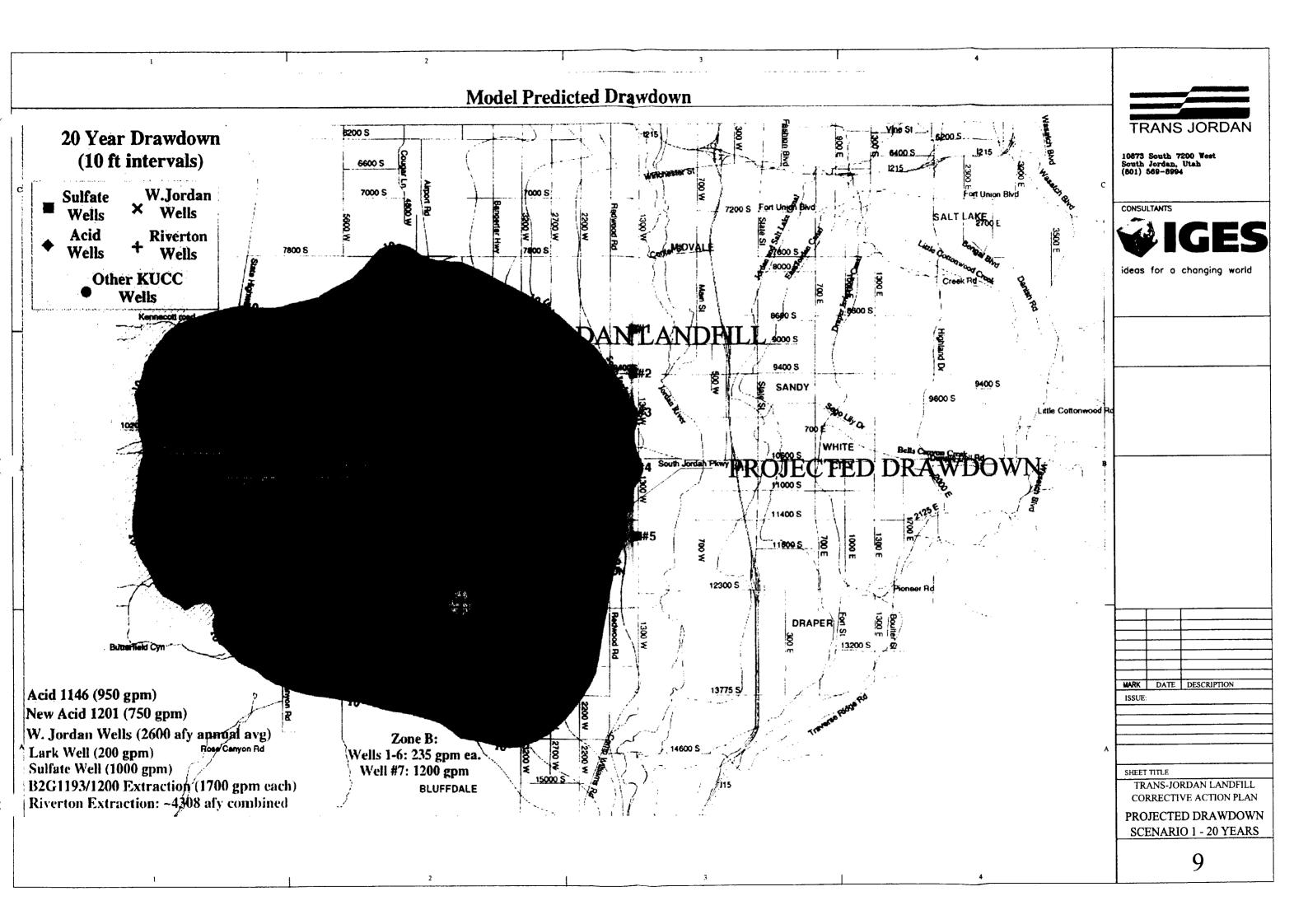
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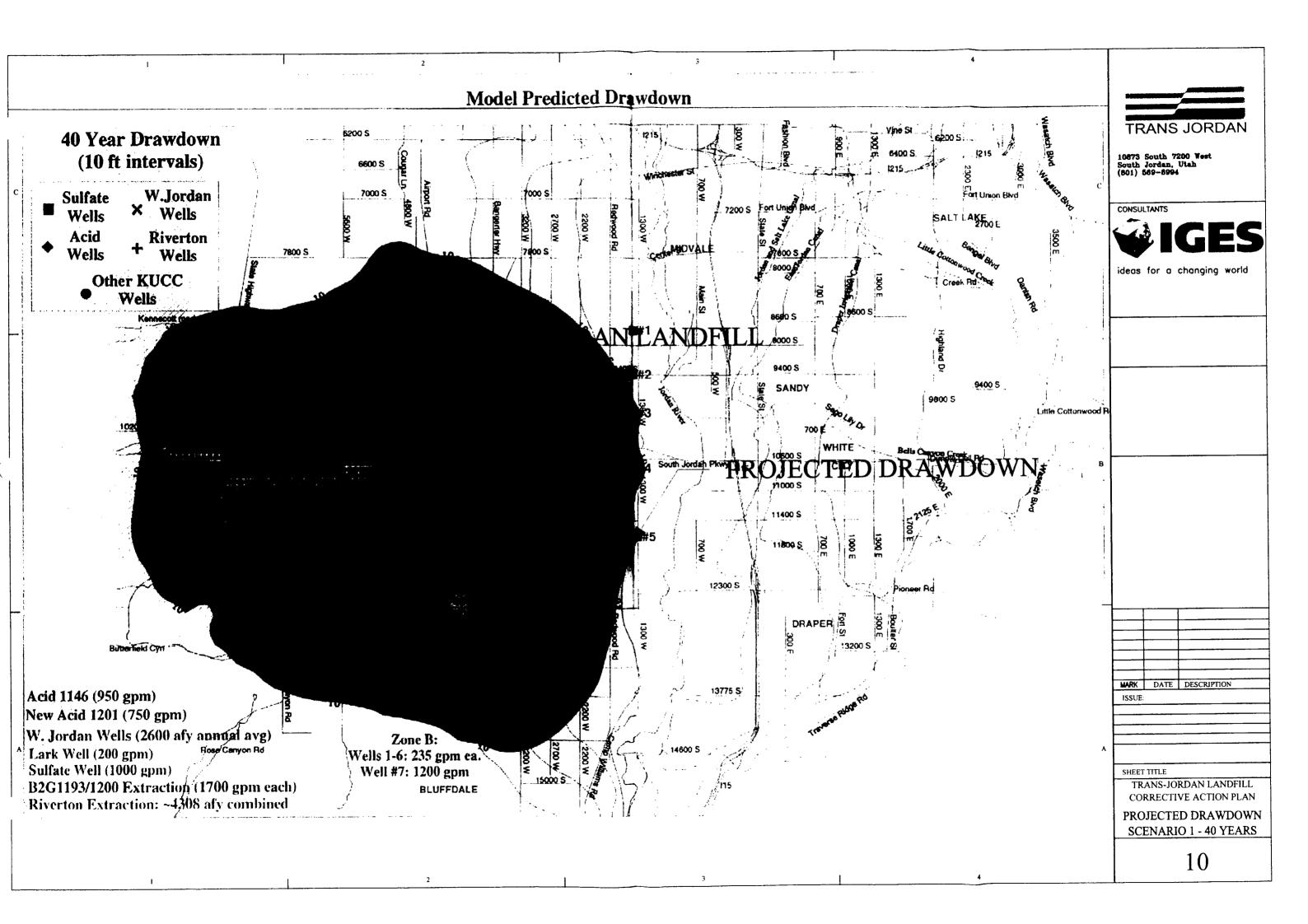


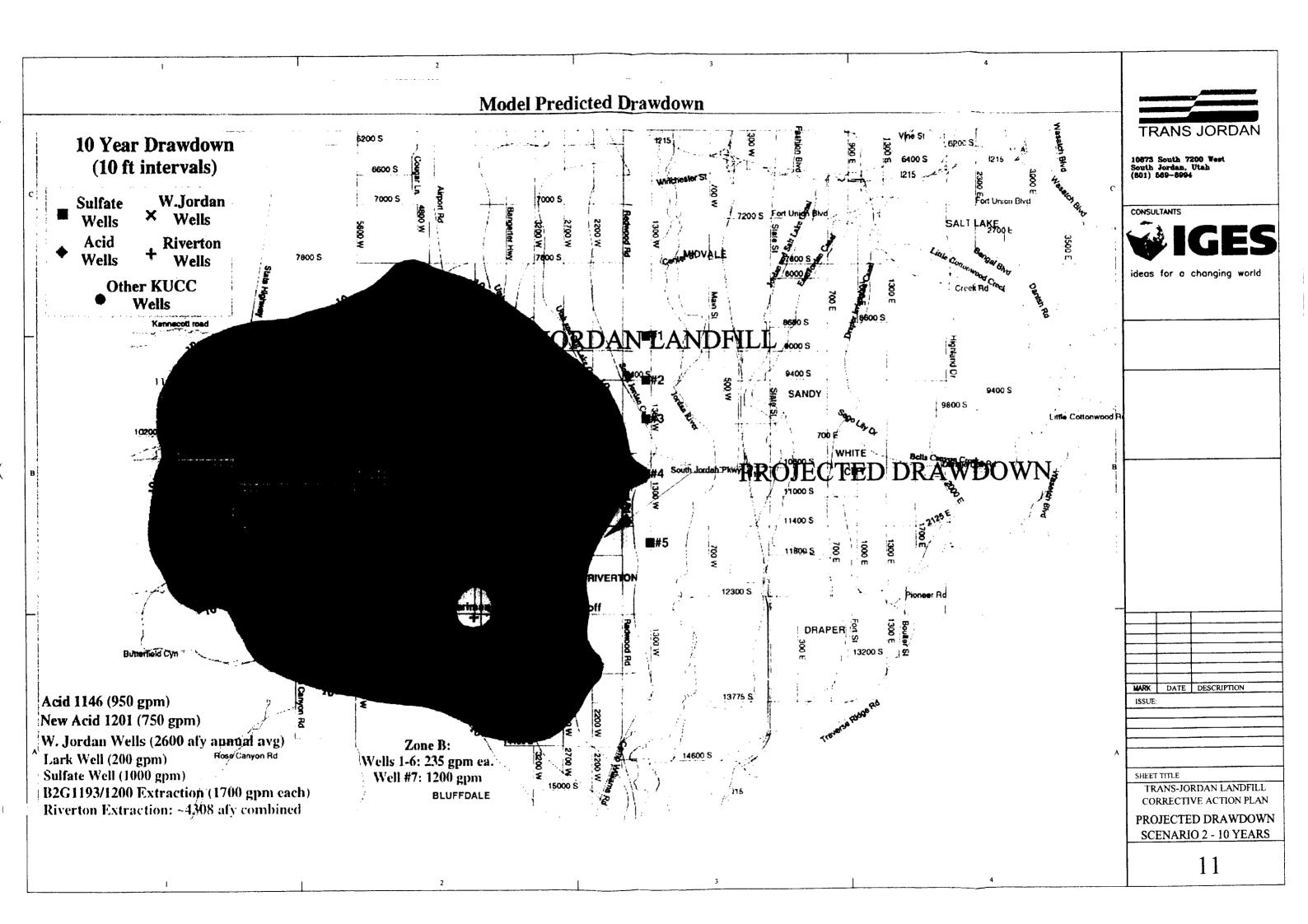


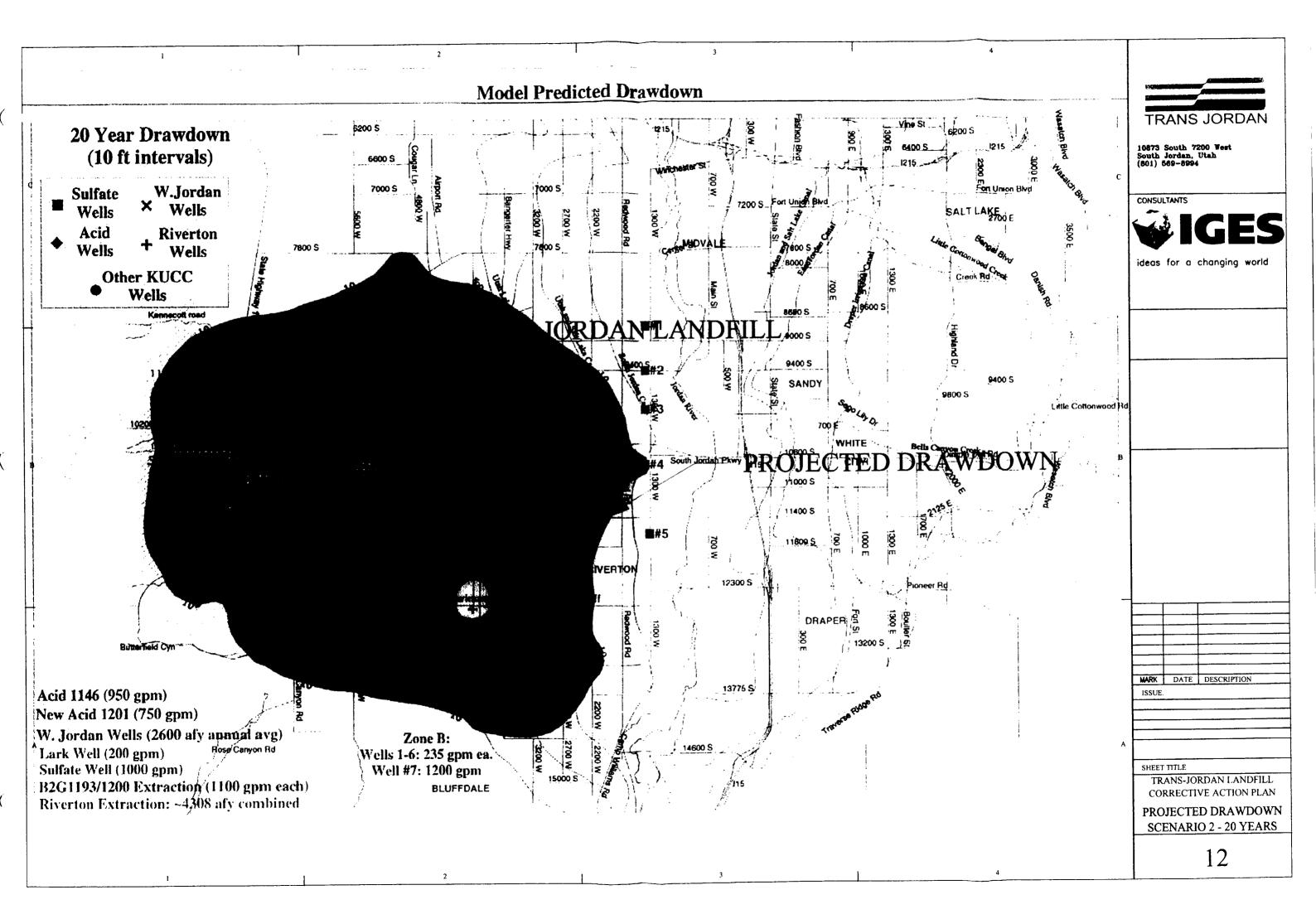


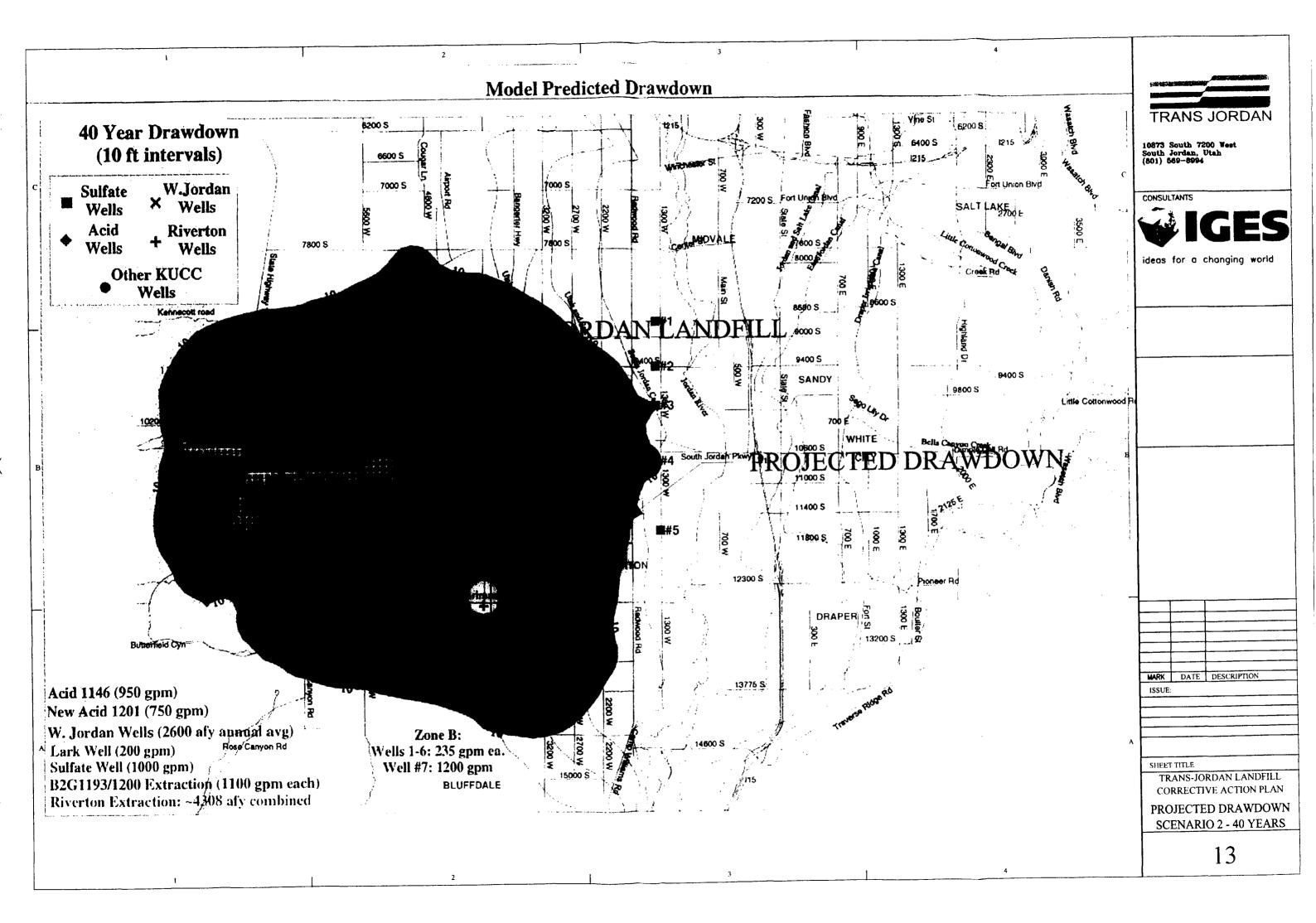












Attachment 3



Intermountain GeoEnvironmental Services, Inc. 182 South 600 East, Suite 206, Salt Lake City, Utah 84102 Phone (801) 521-1800 | Fax (801) 521-2800

www.igesinc.com

Trans-Jordan Landfill 2002 Groundwater Monitoring Report

IGES Job No. 00102-001

February 20, 2003

Prepared for:

Trans-Jordan Cities

c/o Mr. Dwayne Woolley 10873 South 7200 West P.O. Box 95610-0610 South Jordan, Utah 84095

THIS DOCUMENT WAS PREPARED FOR USE ONLY BY THE CLIENT, ONLY FOR THE PURPOSES STATED, AND WITHIN A REASONABLE TIME FROM ITS ISSUANCE, PLEASE READ THE "LIMITATIONS" SECTION OF THIS REPORT

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF WORK

The purpose of this report is to present the results of recent groundwater analysis, including groundwater chemistry, depth to water and direction of flow under the Trans Jordan Landfill (TJL). This report summarizes any statistical changes that may have occurred during 2002. The period of review for this assessment is generally limited to the readings over the past year; however, the statistical assessment extends through the entire history of the sampling rounds.

The scope of work performed for this assessment includes a review of the 2002 sampling data, a statistical assessment of the readings, and the preparation of this report.

The recommendations contained in this report are subject to the limitations presented in the "Limitations" section of this report.

1.2 PROJECT DESCRIPTION

TJL is a municipal solid waste landfill located at 10873 South 7200 West, South Jordan, Utah, in Salt Lake County. TJL is located in Section 15, Township 3 South, Range 2 West.

TJL currently has one up gradient and three down gradient monitoring wells on the property that are utilized for groundwater monitoring and sampling. The up gradient well is identified as TJMW-2 while the down gradient wells are TJMW-3, TJMW-4 and TJMW-5. These sampling wells were originally installed based on the predominant groundwater flow being west to east. However, the construction of a groundwater cutoff wall completed by Kennecott Utah Corporation (KUC), several years of below average precipitation, and down gradient water usage all have contributed to the drop in water levels and have altered the groundwater gradient at the site. Because of these activities and possible other unknown conditions, the TJL monitoring wells are drying up and the groundwater gradient appears to be trending south. The Groundwater Contour Maps and Field Sampling Data Summary Sheets located in Appendix D show the apparent flow direction and groundwater elevations over time.

TJMW-1 was originally installed as an up gradient well but is currently no longer used for groundwater sampling. However, groundwater elevations are measured in TJMW-1 quarterly. This well did not accurately represent general background water conditions as compared to other historic groundwater quality data from monitoring wells in the area. TJMW-2 was installed in January of 1995 and has since served as the up gradient well for the landfill.

In 2002, four sampling rounds were completed for TJMW-4 and TJMW-5. One sampling round was completed for TJMW-2 and no rounds were completed for TJMW-3. TJMW-2 dried up and could not be sampled during the final three rounds in 2002 and TJMW-3 dried up and could not be sampled at all during the year 2002. The dates, wells sampled and analysis performed for these rounds are summarized below:

Table 1 - Summary of 2002 Groundwater Sampling Events

Sampling Date	Well(s) Sampled	Analysis Performed
3/05/02	TJMW-2,	Complete
	TJMW-4 & TJMW-5	
6/28/02	TJMW-4 & TJMW-5	Complete
9/24/02	TJMW-4 & TJMW-5	Complete
12/10/02	TJMW-4 & TJMW-5	Complete

The results of the analyses performed on the groundwater samples were reviewed and constituents of concern were identified. To aid in identifying constituents of concern, the following steps were implemented in our assessment:

- Step 1 Identify constituents with laboratory detectable concentrations for each of the wells.
- Step 2 Perform ANOVA statistical assessments on groundwater quality data for each constituent identified in Step 1, comparing down gradient to up gradient wells.

- Step 3 Identify constituents with higher down gradient concentrations than upgradient for data sets identified as ANOVA significant in Step 2.
- Step 4 Identify constituents of concern, i.e., those identified in Step 3 with concentrations higher than the Groundwater Protection Standards.
- Step 5 Perform confidence interval analyses on constituents of concern identified in Step 4.

The following sections of the report provide information on the analytical results for each well, a discussion of the statistical evaluation of the analytical results and conclusions and recommendations based on the analytical test results, statistical evaluation and constituents of concern assessment.

2.0 MONITORING WELL SUMMARIES

2.1 MONITORING WELL TJMW-2

Monitoring Well TJMW-2 is completed to a depth of 455 feet below ground surface (Elevation 4814.16) and was drilled and installed in January 1995. The well serves the TJL as the site up gradient well.

Summary of Analytical Results for 2002 sampling period

One groundwater-sampling round was completed for this well in 2002. This sampling round was performed on March 5, 2002 and constituted the 34th round for this particular well.

Several constituents have historically had concentrations higher than the groundwater protection standards presented on the list of Constituents for Detection Monitoring (Table R315-308-4 in The Manual for Solid Waste Permitting and Management Rules R315-301 through 320, Utah Administrative Code). That trend continues and many of the constituents remain consistent with historical values. However, Arsenic, which measured slightly above the standard (0.05 mg/l) on one occasion in 2000 and did not measure above the standard in 2001 was non-detectable (<0.005 mg/l) in 2002. Also, for the first time, a hit of Tetrachloroethylene (Tetrachloroethene) was obtained. A concentration of 0.0036 mg/l was detected, which is below the groundwater protection standard of 0.005 mg/l.

The list of constituents having measured concentrations at or above the groundwater protection standards for Well TJMW-2 in the single 2002 sampling round are listed in the following table:

Well TJMW-2 (continued on the next page)

Constituent	Groundwater Protection Standard (mg/l)	Sampling Round 34 (mg/l)
Beryllium	0.004	0.086
Cadmium	0.005	0.390
Cobalt	2.0	3.6
Copper	1.3	21.0

Constituent	Groundwater Protection Standard (mg/l)	Sampling Round 34 (mg/l)				
Lead	0.015	0.024				
Nickel	0.1	5.4				
Thallium	0.002	0.0056				
Zinc	5.0	31.0				

2.2 MONITORING WELL TJMW-3

Monitoring well TJMW-3 is completed to a depth of 319 feet below ground surface (Elevation 4710.77) and was drilled and installed in December of 1995 as a down gradient well.

Summary of Analytical Results for 2002 sampling period

Due to the lack of water in well TJMW-3, analytical testing could not be conducted. However, just enough water was present to obtain a water level reading. The groundwater levels are shown in The Field Data Sampling Summary Sheet in Appendix D.

As a summary for well TJMW-3, during the 2001 analytical results three of the heavy metals analyzed were above the groundwater protection standard. It should be noted that throughout the well's history, as many as 15 constituents have been above the reporting limits. Several of these constituent levels dropped below the standards over time and an overall trend of these constituents reducing with time was apparent.

2.3 MONITORING WELL TJMW-4

Monitoring well TJMW-4 is completed to a depth of 365 feet below ground surface and was drilled and installed in November of 1997 as a down gradient well.

Summary of Analytical Results for 2002 sampling period

Four groundwater-sampling rounds were completed for this well in 2002. Dates for the sampling rounds are summarized in Table 1. These sampling rounds constitute the 16th, 17th 18th and 19th rounds for this particular well.

Based on the results of the 2002 chemical analysis, two of the heavy metals analyzed were above the groundwater protection standards, Lead and Thallium. In general, Lead was lower than previous years but still exceeded the standards. Thallium was just slightly above this standard with one reading of 0.0021 mg/l in March of 2002, while the other rounds were all non-detect (<0.001 mg/l). Arsenic, Chromium and Nickel, which were above the groundwater protection standards in 2001, did not exceed the standards in 2002.

No organic constituents were observed above the groundwater protection standards in Well TJMW-4.

The list of constituents having measured concentrations at or above the groundwater protection standards for Well TJMW-4 in the 2002 sampling rounds are listed in the following table:

Well TJMW-4

Constituent	Groundwater Protection Standard (mg/l)	Sampling Round 16 (mg/l)	Sampling Round 17 (mg/l)	Sampling Round 18 (mg/l)	Sampling Round 19 (mg/l)
Lead	0.015	0.061	0.065	0.044	0.033
Thallium	0.002	0.0021	<0.001	< 0.001	< 0.001

2.4 MONITORING WELL TJMW-5

Monitoring well TJMW-5 is completed to a depth of 365 feet below ground surface (Elevation 4705.9) and was drilled and installed in July of 1998 as a down gradient well.

Summary of Analytical Results for 2002 sampling period

Four groundwater-sampling rounds were completed for this well in 2002. Dates for the sampling rounds are summarized in Table 1. These sampling rounds constitute the 16th, 17th, 18th and 19th rounds for this particular well.

Based on the results of the 2002 chemical analysis, two of the heavy metals are above the groundwater protection standards, Lead and Thallium. In general, Lead was lower than previous years but still exceeded the standards. Thallium was just slightly above the

standard (0.002 mg/l) with one reading of 0.0021 mg/l in March of 2002, while the other rounds were lower than groundwater protection standards or non-detect (<0.001 mg/l). Arsenic, which measured above the standard in 2001, measured below the standard in 2002.

Of the organic constituents analyzed, Tetrachloroethene continued to be above the groundwater protection standard in Well TJMW-5 and has generally increased from historical values. Also, 1,1,1-Trichloroethane, even though it is below the groundwater protection standard, has also shown an increase over time.

The list of constituents having measured concentrations at or above the groundwater protection standards for Well TJMW-5 in the 2002 sampling rounds are listed in the following table:

Well TJMW-5

Constituent	Groundwater Protection Standard (mg/l)	Sampling Round 16 (mg/l)	Sampling Round 17 (mg/l)	Sampling Round 18 (mg/l)	Sampling Round 19 (mg/l)	
Lead	0.015	0.10	0.045	0.087	0.022	
Thallium	0.002	0.0021	< 0.001	0.0017	< 0.001	
Tetrachloroethene	0.005	0.016	0.011	0.015	0.014	

3.0 STATISTICAL EVALUATION OF ANALYTICAL RESULTS

The statistical analysis was performed on all constituents returning a measurable concentration in any of the 2002 sampling rounds. Statistical analyses recommended by the EPA (1989, 1992) were performed on groundwater quality data for monitoring wells TJMW-2 (background) TJMW-3, TJMW-4 and TJMW-5 (down gradient). Further statistical analysis of Tetrachloroethene concentrations observed in well TJMW-5 was performed since it was reported above the groundwater protection standards and was not observed in the up gradient well at similar concentrations.

The "Sanitas" software package was used to perform the statistical assessment of the data. Sanitas is a statistical package that follows the EPA process and performs the type of analysis allowed. A flowchart depicting the steps used in the statistical analyses is presented as Plate 1 of Appendix A.

Generally, the analysis completed for the constituents was an interwell Parametric Analysis of Variance (ANOVA). Where the data for a particular constituent had greater than 15% non-detects, a non-parametric ANOVA was completed.

Several cases were encountered where outliers in the data were encountered. Removal of these points would change the data from a non-normal or non-log normal distribution to a normal or log normal distribution. This type of distribution is more appropriate for a statistical assessment. However, EPA recommends that where sufficient reason for removal of the outliers is not available, the data should be kept in the assessment. Since there was no evidence to support the removal of collected data, none of the identified outlier data was removed from the statistical assessment.

Several constituents had results that were ANOVA significant, indicating that the down gradient wells had a statistically different distribution than the up gradient well. A summary table presenting the ANOVA significant results of all constituents with measurable concentrations is presented in Appendix A. Time series graphs for all constituents in this summary table are presented in Appendix B of this report. A review of the data for the constituents listed was completed to identify any unusual characteristics and any suspicious data was checked against the original records.

To continue progressing towards identifying constituents of concern, the time series graphs in Appendix B were also used to compare concentrations in the down gradient wells to the up gradient well for those constituents identified as being ANOVA significant. The following ANOVA significant constituents were identified as having higher measured concentrations down gradient than up gradient in the 2002 sampling rounds:

- Nitrate
- Bicarbonate
- Calcium
- Potassium
- Arsenic
- Barium
- 1.1 Dichloroethene
- Tetrachloroethene
- 1,1,1 Trichloroethane
- Trichloroflouromethane
- Dichlorodiflouromethane

To define the constituents of concern, the constituents listed above were compared to the groundwater protection standards. Only Tetrachloroethene in TJMW-5 was above the groundwater protection standards and was identified as a constituent of concern.

Confidence intervals were performed on this constituent over the last 10 sampling rounds. Based on the Non-Parametric Confidence Interval analysis, the compliance limit of 0.005 mg/l for Tetrachloroethene was not exceeded. The results of this analysis are included in Appendix C.

4.0 GROUNDWATER ELEVATIONS

Groundwater elevations in the four monitoring wells have been decreasing over the past few years. As noted previously, wells TJMW-2 and TJMW-3 have dried up to the point that analytical samples can no longer be taken. Also mentioned previously, it is suspected that an up gradient groundwater cutoff wall completed by Kennecott Utah Corporation (KUC), several years of below average precipitation, and down gradient water usage all have contributed to the drop in water levels.

It should also be noted that Kennecott will begin an extensive groundwater recovery/remediation program immediately adjacent to the Trans Jordan site. This process will have an even greater impact to the groundwater elevations and direction of flow at the site. As the impacts from the Kennecott project become evident, modifications to the Trans Jordan groundwater monitoring program will be necessary.

A summary of the change in groundwater elevation and water column height in the wells are provided below:

Summary of Groundwater Elevations and Water Column Heights

Well Identification	Initial GW Elevation	Initial Height of Water Column	Dec. 2002 GW Elevation	Dec. 2002 Height of Water Column		
TJMW-1	4852.96	38.80	4828.32	14.16		
TJMW-2	4747.27	34.50	4712.82	DRY		
TJMW-3	4741.04	30.27	4710.09	DRY		
TJMW-4	4728.28	21.85	4710.59	4.16		
TJMW-5	4727.09	21.19	4710.44	4.54		

These new groundwater elevations for 2002 reflect a general decrease of over three feet from the past year with groundwater elevations in the wells having dropped between 17 and 34 feet since the initial well construction. As noted previously, these new groundwater elevations reflect a change in the direction of the groundwater flow from generally east to generally south, which impacts the up gradient/down gradient well status and ultimately the statistical analysis. Plots of the groundwater contours and complete records, including graphs, of the groundwater elevations over time in all the wells are included in Appendix D.

5.0 CONCLUSIONS AND RECOMMENDATIONS

In general, organic constituents that have been a concern in the past appear to be decreasing in concentration with time with the exception being Tetrachloroethene. Tetrachloroethene continues to be measured in concentrations above groundwater protection standards in well TJMW-5 and has trended slightly higher in recent years.

Based on a confidence interval analysis of the ten most recent measured concentrations of Tetrachloroethene in well TJMW-5, concentrations currently do not exceed the groundwater protection standard of 0.005 mg/l. However, based on our projections, it is likely the confidence interval for Tetrachloroethene in well TJMW-5 will be exceeded with the next sampling round.

As discussed, Lead and Thallium are metals that have measurable concentrations above groundwater protection standards in the down gradient wells. However, measured concentrations of these metals and others are consistently higher in the up gradient well or are not ANOVA significant and therefore are not considered to be caused by TJL.

Nitrate, Bicarbonate, Calcium, Potassium, 1,1 Dichloroethene, 1,1,1 Trichloroethane, Trichlorofluoromethane and Dichlorodiflouromethane were observed to have higher measured concentrations down gradient than up gradient but either they did not exceed the groundwater protection standards or are not currently regulated under the groundwater protection standards.

The Sampling and Analysis Plan has not been finalized due to the dropping water levels and their impact to the groundwater monitoring system.

6.0 LIMITATIONS

The recommendations contained in this report are based, in part, on historical sampling data that was performed by others and on ongoing data collected by IGES. IGES assumes no liability as to the accuracy of the historical data used in this assessment.

This report was prepared in accordance with the generally accepted standard of practice at the time this report was written. No warranty, expressed or implied, is made.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding this report, please do not hesitate to contact us at your convenience (801) 521-1800.

Respectfully submitted,

IGES, Inc.

Kent A. Hartley, P.E.

Associate

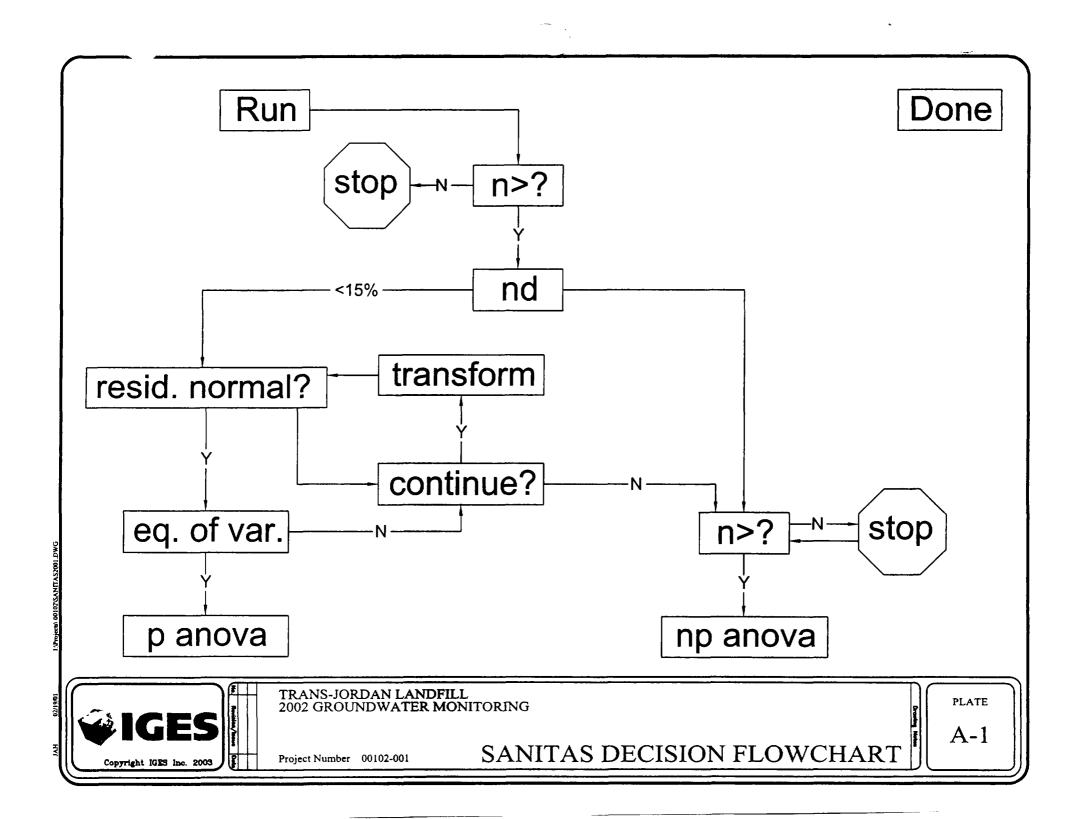
Brett D. Mickelson, P.E.

Principal

Appendix A

(2002 Groundwater Monitoring Report)

I,



Analysis of Variance Summary

Date: 2/20/03, 4:22 PM

Facility: Trans-Jordan-Cities/

Data File: 2002gw		Client: IGES

Constituent	CAS#	Well	Calculated	Critical	Signif.	Alpha	Bg Wells	Transform	ANOVA Sig.	Alpha	Method
Ammonia (mg/l)	7664-41-7	MW-3	-33.006	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Ammonia (mg/l)	7664-41-7	MW-4	-36.433	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Ammonia (mg/l)	7664-41-7	MW-5	-33.960	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Nitrate (mg/l)	n/a	MW-3	42.976	15.126	Yes	0.01667	MW-2	D/a	Yes	0.05	NP (non-detects)
Nitrate (mg/l)	n/a	MW-4	49.187	15.395	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Nitrate (mg/l)	n/a	MW-5	24.837	15.126	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Bicarbonate (mg/l)	n/a	MW-3	40.605	15.247	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Bicarbonate (mg/l)	n/a	MW-4	23.944	15.498	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Bicarbonate (mg/l)	n/a	MW-5	60.000	15.498	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
pH (pH-units)	n/a	MW-3	45.684	15.247	Yes	0.01667	MW-2	11/2	Yes	0.05	NP (equality of variance)
pH (pH-units)	TI/S	MW-4	45.583	15.498	Yes	0.01667	MW-2	5/8	Yes	0.05	NP (equality of variance)
pH (pH-units)	n/a	MW-5	33.000	15.498	Yes	0.01667	MW-2	D/a	Yes	0.05	NP (equality of variance
Calcium (mg/l)	n/a	MW-3	2.47	0.571	Yes	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Calcium (mg/l)	n/a	MW-4	1.25	0.581	Yes	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Calcium (mg/l)	n/a	MW-5	4.79	0.581	Yes	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Potassium (mg/l)	π/≥	MW-3	2.785	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Potassium (rng/l)	n/a	MW-4	14.788	15.498	No	0.01667	MW-2	D/2	Yes	0.05	NP (normality)
Potassium (mg/l)	n/a	MW-5	36.371	15.498	Yes	0.01667	MW-2	D/a	Yes	0.05	NP (normality)
Chloride (mg/l)	n/a	MW-3	-40.075	15.247	No	0.01667	MW-2	D/2	Yes	0.05	NP (normality)
Chloride (mg/l)	D/R	MW-4	-28.786	15.498	No	0.01667	MW-2	E/A	Yes	0.05	NP (normality)
Chloride (mg/l)	n/a	MW-5	-15.536	15.498	No	0.01667	MW-2	D/a	Yes	0.05	NP (normality)
Sodium (mg/l)	n/a	MW-3	6.344	15.247	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Sodium (mg/l)	n/a	MW-4	-3.810	15.498	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Sodium (mg/l)	13/2	MW-5	-2.393	15.498	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Iron (mg/l)	7439-89-6	MW-3	-2.33	1.43	No	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Iron (mg/l)	7439-89-6	MW-4	-1.27	1.46	No	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Iron (mg/l)	7439-89-6	MW-5	-2.31	1.46	No	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Sulfate (mg/l)	n/a	MW-3	-39.737	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Sulfate (mg/l)	D/a	MW-4	-56.694	15.498	No	0.01667	MW-2	1/2	Yes	0.05	NP (normality)
Sulfate (mg/l)	n/a	MW-5	-28.167	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Magnesium (mg/l)	n/a	MW-3	-45.474	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Magnesium (mg/l)	n/a	MW-4	-54.444	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Magnesium (mg/l)	n/a	MW-5	-24.361	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
TDS (mg/l)	11/2	MW-3	-46.237	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
TDS (mg/l)	n/a	MW-4	-51.417	15.498	No	0.01667	MW-2	11/9	Yes	0.05	NP (normality)
TDS (mg/l)	n/a	MW-5	-26.583	15.498	No	0.01667	MW-2	0/2	Yes	0.05	NP (normality)
Manganese (mg/l)	7439-96-5	MW-3	-42.132	15.247	No	0.01667	MW-2	n/1	Yes	0.05	NP (normality)

Analysis of ance Summary

Date: 2/20/03, 4:22 PM

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Facility: Trans-Jordan-Cities/

Data File: 2002gw Client: IGES

Constituent	CAS#	<u>WelJ</u>	Calculated	Critical	Signif.	Alpha	Bg Wells	Transform	ANOVA Sig.	Alpha	Method
Manganese (mg/l)	7439-96-5	MW-4	-40.583	15.498	No	0.01667	MW-2	p/a	Yes	0.05	NP (normality)
Manganese (mg/l)	7439-96-5	MW-5	-37.139	15.498	No	0.01667	MW-2	p/a	Yes	0.05	NP (normality)
TOC (mg/l)	п/а	MW-3	-1.667	15.049	No	0.01667	MW-2	n/a	No	0.05	NP (non-detects)
TOC (mg/l)	n/a	MW-4	0.667	15.049	No	0.01667	MW-2	p/a	No	0.05	NP (non-detects)
TOC (mg/l)	n/a	MW-5	12.039	15.312	No	0.01667	MW-2	n/a	No	0.05	NP (non-detects)
Arsenic (mg/l)	7440-38-2	MW-3	13.133	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Arsenic (mg/l)	7440-38-2	MW-4	24.293	16.719	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Arsenic (mg/l)	7440-38-2	MW-5	11.285	17.011	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Barium (mg/l)	7440-39-3	MW-3	0.138	0.157	No	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Barium (mg/l)	7440-39-3	MW-4	0.263	0.16	Yes	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Barium (mg/l)	7440-39-3	MW-5	0.109	0.16	No	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Beryllium (mg/l)	7440-41-7	MW-3	-45.854	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Beryllium (mg/l)	7440-41-7	MW-4	-42.658	16.719	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Beryllium (mg/l)	7440-41-7	MW-5	-53.111	17.011	No	0.01667	MW-2	B/2	Yes	0.05	NP (non-detects)
Cadmium (mg/l)	7440-43-9	MW-3	-45.542	15.575	No	0.01667	MW-2	g/à	Yes	0.05	NP (non-detects)
Cadmium (mg/l)	7440-43-9	MW-4	-49.921	16.719	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Cadmium (mg/l)	7440-43-9	MW-5	-45.861	17.011	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Chromium (mg/l)	п/а_	MW-3	-12.165	15.575	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Chromium (mg/l)	n/a	MW-4	-4.447	16.719	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Chromium (mg/l)	D/ a	MW-5	-17.699	17.011	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Cobalt (mg/l)	7440-48-4	MW-3	-44.816	15.247	No	0.01667	MW-2	rs/a	Yes	0.05	NP (non-detects)
Cobalt (mg/l)	7440-48-4	MW-4	-40.556	15.498	No	0.01667	MW-2	D/A	Yes	0.05	NP (non-detects)
Cobalt (mg/l)	7440-48-4	MW-5	-38.944	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Copper (mg/l)	7440-50-8	MW-3	-48.208	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (equality of variance)
Copper (mg/l)	7440-50-8	MW-4	-41.553	16.719	No	0.01667	MW-2	n/a	Yes	0.05	NP (equality of variance)
Copper (mg/l)	7440-50-8	MW-5	-51.139	17.011	No	0.01667	MW-2	n/s	Yes	0.05	NP (equality of variance)
		MW-3	-1.273	15.575	No.	0.01667	MW-2	n/a	No	0.05	
Lead (mg/l)	n/a			16.719		0.01667	MW-2			0.05	NP (equality of variance)
Lead (mg/l)	n/2	MW-4	1.113		No No		MW-2	n/a	No		NP (equality of variance)
Lead (mg/l)	n/a	MW-5	-17.439	17.011	No	0.01667		D/a	No	0.05	NP (equality of variance)
Nickel (mg/l)	7440-02-0	MW-3	-41.7 50	15.410	No	0.01667	MW-2	D/2	Yes	0.05	NP (normality)
Nickel (mg/I)	7440-02-0	MW-4	-44.778	16.831	No 	0.01667	MW-2	п/а	Yes	0.05	NP (normality)
Nickel (mg/l)	7440-02-0	MW-5	-54.556	16.831	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Silver (mg/l)	7440-22-4	MW-3	-15.172	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Silver (mg/l)	7440-22-4	MW-4	-17.371	16.719	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Silver (mg/l)	7440-22-4	MW-5	-1 7.929	17.011	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Thallium (mg/l)	n/a	MW-3	-19.951	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Thallium (mg/l)	n/a	MW-4	-34.181	16.719	No	0.01667	MW-2	D/S	Yes	0.05	NP (non-detects)

Analysis of iance Summary

Date: 2/20/03, 4:22 PM

Facility: Trans-Jordan-Cities/

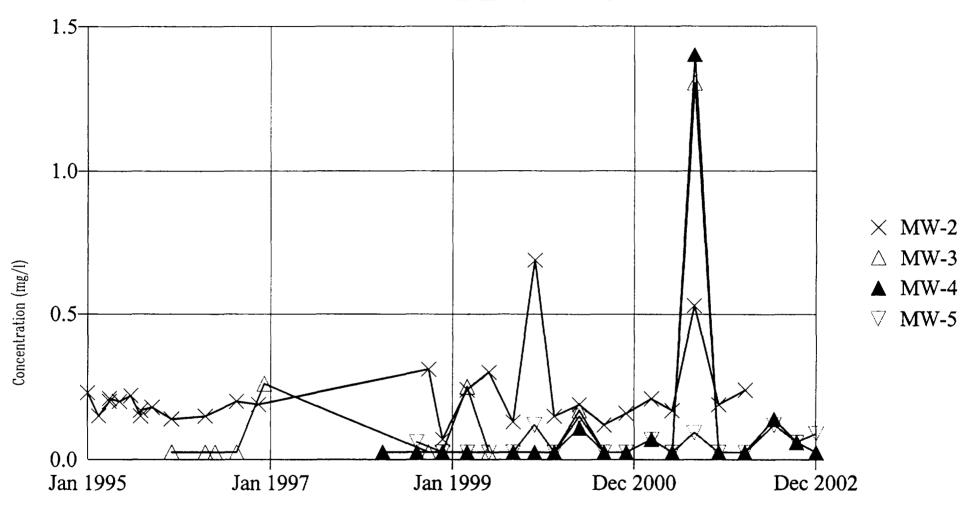
Client: IGES

Data File: 2002gw

Constituent	CAS#	<u>Well</u>	Calculated	Critical	Signif.	Alpha	Bg Wells	Transform	ANOVA Sig.	Alpha	Method
Thallium (mg/l)	n/a	MW-5	-42.159	17.011	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Vanadium (mg/l)	7440-62-2	MW-3	-15.852	15.247	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Vanadium (mg/l)	7440-62-2	MW-4	-10.450	15.498	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Vanadium (mg/l)	7440-62-2	MW-5	-17.034	15,498	No	0.01667	MW-2	n/s	No	0.05	NP (normality)
Zinc (mg/l)	7440-66-6	MW-3	-47.625	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Zinc (mg/l)	7440-66-6	MW-4	-44.605	16.719	No	0.01667	MW-2	n/s	Yes	0.05	NP (normality)
Zinc (mg/l)	7440-66-6	MW-5	-48.694	17.011	No	0.01667	MW-2	n/s	Yes	0.05	NP (normality)
Chloroethane (ug/l)	75-00-3	MW-3	-3.554	15.674	No	0.01667	MW-2	n/a	No	0.05	NP (non-detects)
Chloroethane (ug/l)	75-00-3	MW-4	-17.306	16.923	No	0.01667	MW-2	n/a	No	0.05	NP (non-detects)
Chloroethane (ug/l)	75-00-3	MW-5	-0.329	16.629	No	0.01667	MW-2	n/a	No	0.05	NP (non-detects)
1,1-Dichloroethene (ug/l)	75-35-4	MW-3	1.848	15.508	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
1,1-Dichloroethene (ug/l)	75-35-4	MW-4	0.000	16.744	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
1,1-Dichloroethene (ug/l)	75-35-4	MW-5	28.639	16.744	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Tetrachioroethene (ug/l)	127-18-4	MW-3	32.701	15.642	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Tetrachloroethene (ug/l)	127-18-4	MW-4	-1.132	17.102	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Tetrachioroethene (ug/l)	127-18-4	MW-5	46.604	16.805	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
1,1,1-Trichloroethane (ug/	71-55-6	MW-3	22.271	15.314	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
1,1,1-Trichloroethane (ug/	71-55-6	MW-4	2.063	17.415	No	0.01667	MW-2	n/a	Yer	0.05	NP (non-detects)
1,1,1-Trichloroethane (ug/	71-55-6	MW-5	50.895	16.453	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Trichlorofluoromethane (ug	75-69-4	MW-3	36.957	15.642	Yes	0.01667	MW-2	11/8	Yes	0.05	NP (non-detects)
Trichlorofluoromethane (ug	75-69-4	MW-4	-1.397	17.102	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Trichloroffuoromethane (ug	75-69-4	MW-5	10.156	16.805	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Dichlorodifluoromethane (u	75-71-8	MW-3	13.407	15.141	No	0.01667	MW-2	D/a	Yes	0.05	NP (non-detects)
Dichlorodifluoromethane (u	75-71-8	MW-4	-5.785	15.995	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Dichlorodifluoromethane (u	75-71-8	MW-5	22.810	15.753	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)

Appendix B

(2002 Groundwater Monitoring Report)



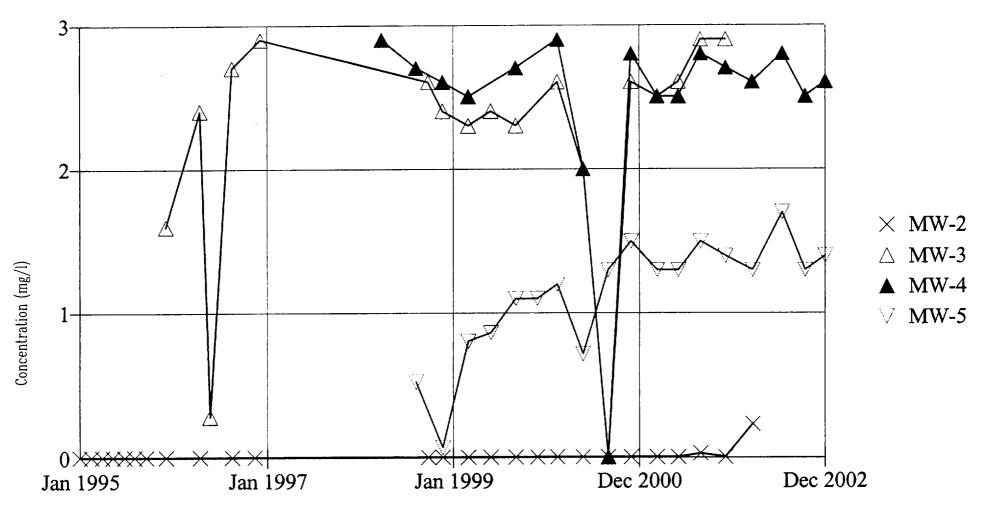
Constituent: Ammonia (mg/l)

Date: 2/20/03, 4:34 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



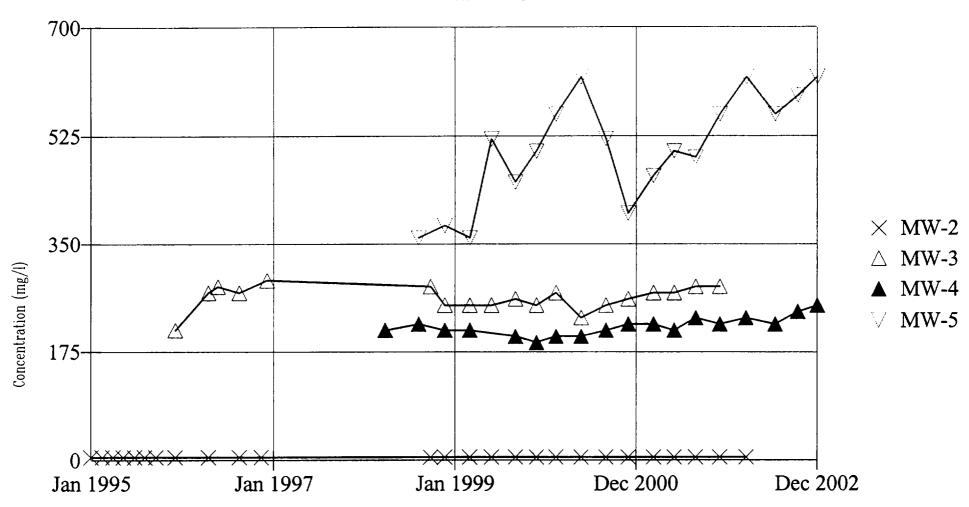
Constituent: Nitrate (mg/l)

Date: 2/20/03, 4:36 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



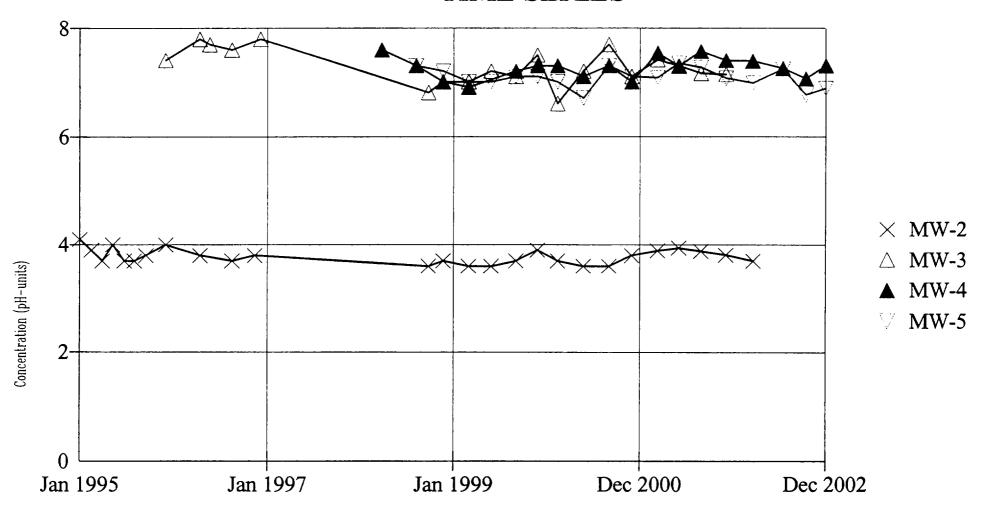
Constituent: Bicarbonate (mg/l)

Date: 2/20/03, 4:37 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



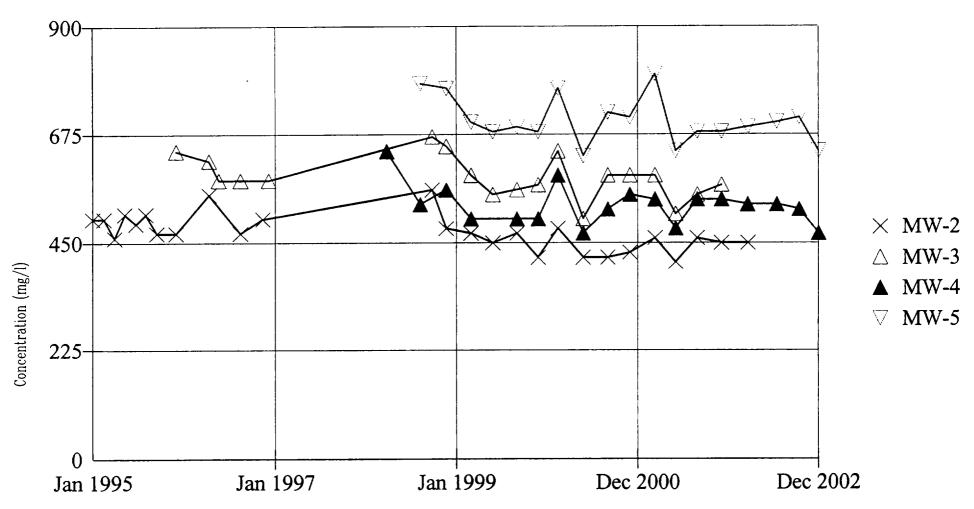
Constituent: pH (pH-units)

Date: 2/20/03, 4:38 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



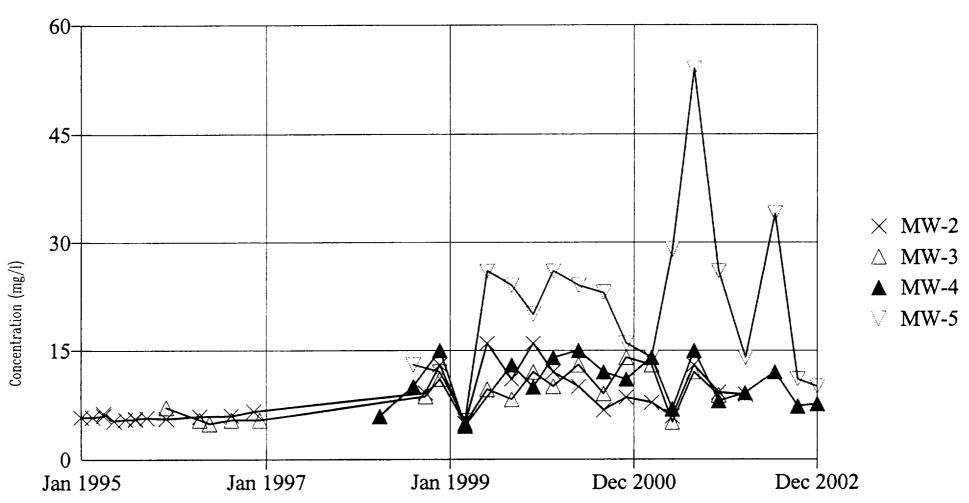
Constituent: Calcium (mg/l)

Date: 2/20/03, 4:39 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



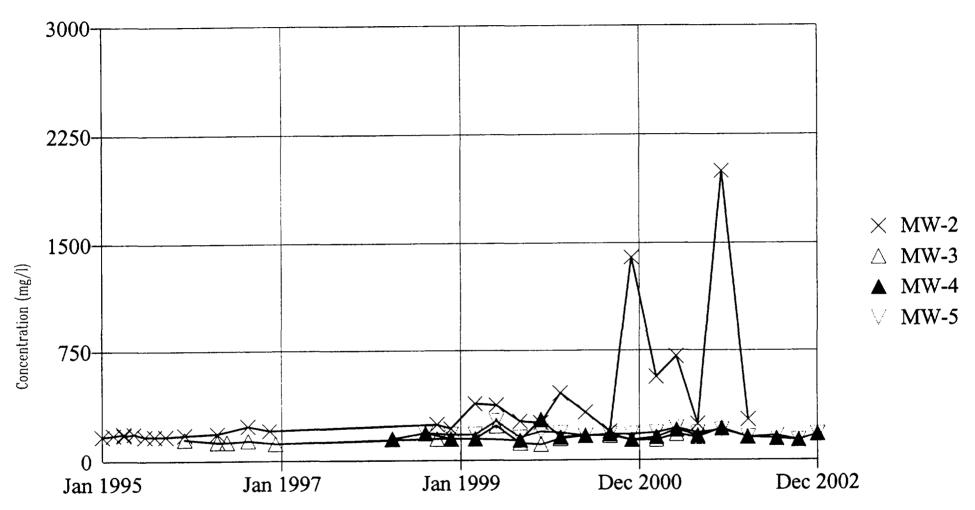
Constituent: Potassium (mg/l)

Date: 2/20/03, 4:40 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Chloride (mg/l)

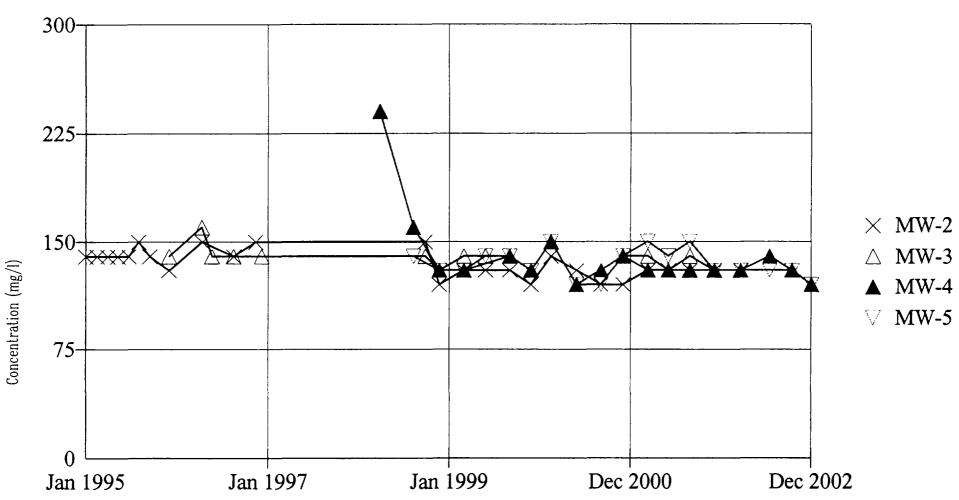
Date: 2/20/03, 4:42 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





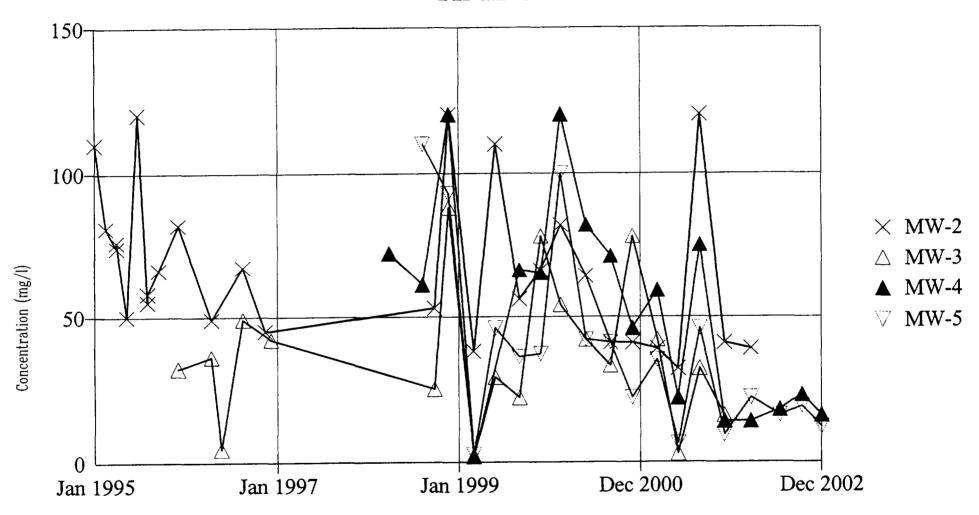
Constituent: Sodium (mg/l)

Date: 2/20/03, 4:43 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



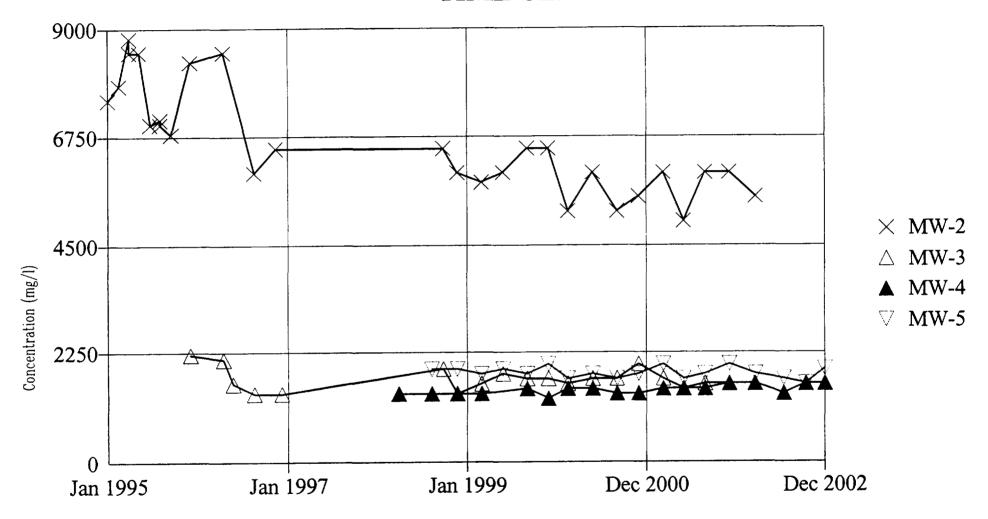
Constituent: Iron (mg/l)

Date: 2/20/03, 4:43 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



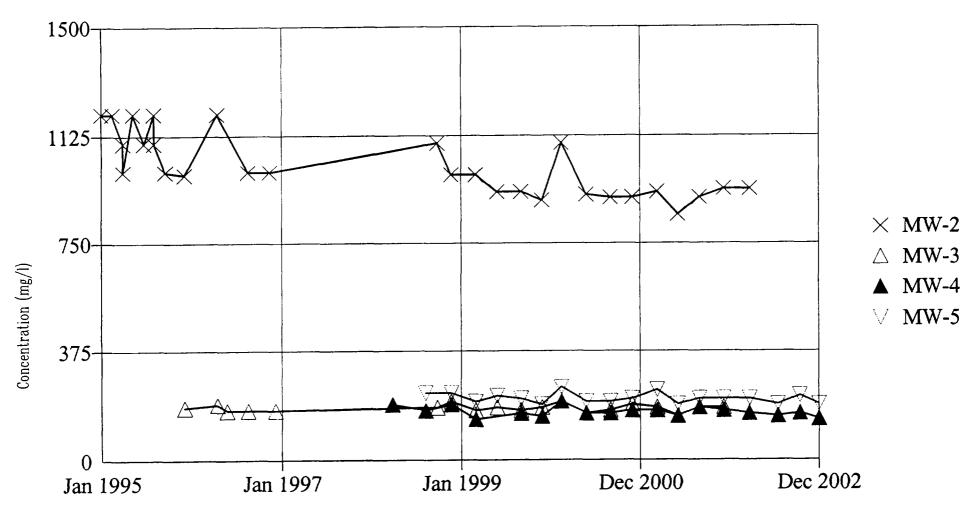
Constituent: Sulfate (mg/l)

Date: 2/20/03, 4:44 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



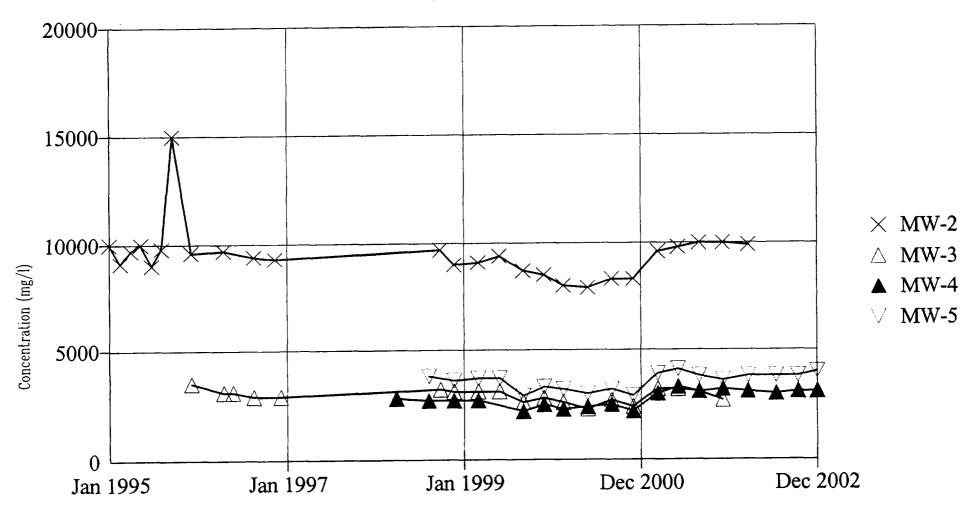
Constituent: Magnesium (mg/l)

Date: 2/20/03, 4:44 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



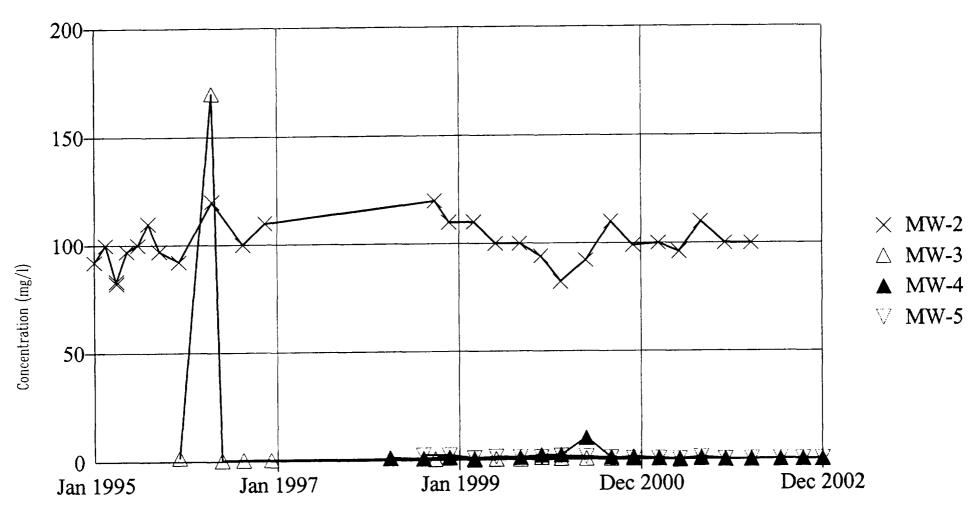
Constituent: TDS (mg/l)

Date: 2/20/03, 4:45 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



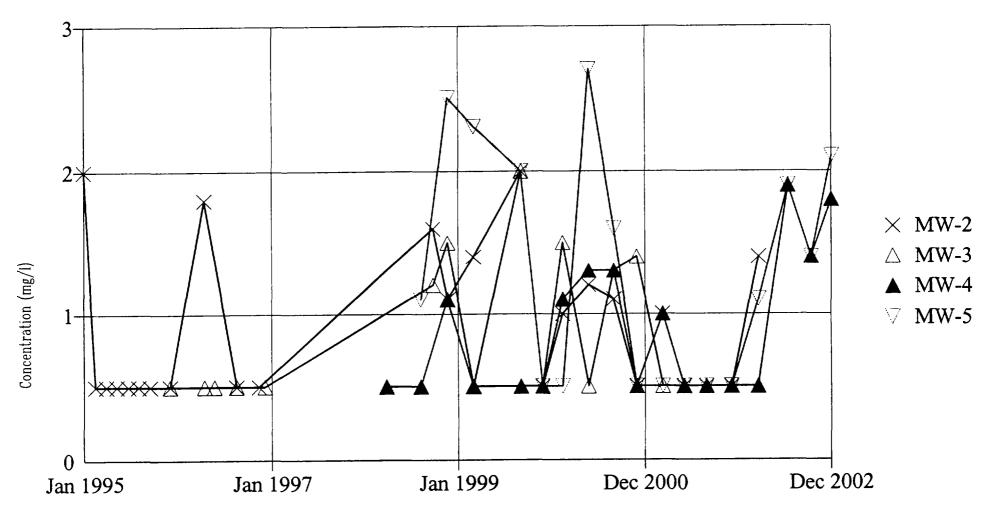
Constituent: Manganese (mg/l)

Date: 2/20/03, 4:46 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



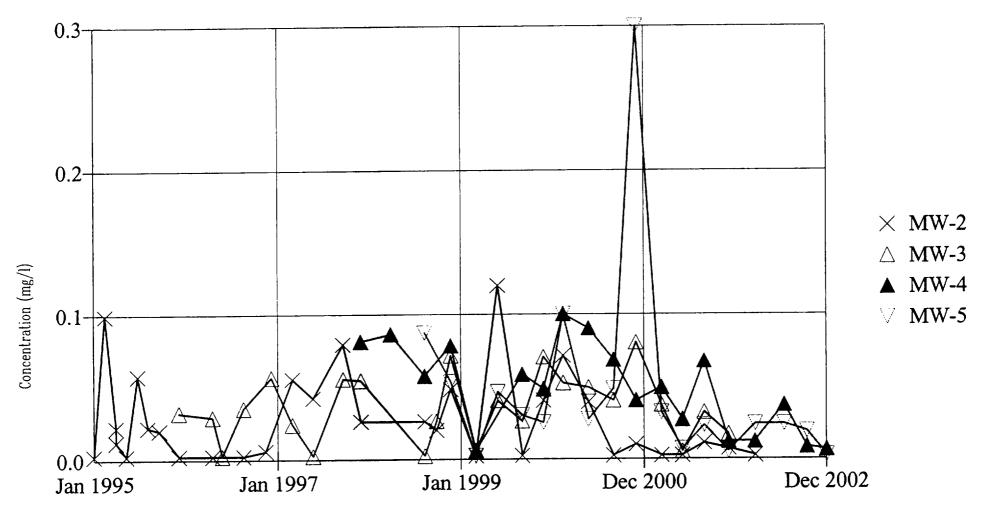
Constituent: TOC (mg/l)

Date: 2/20/03, 4:46 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



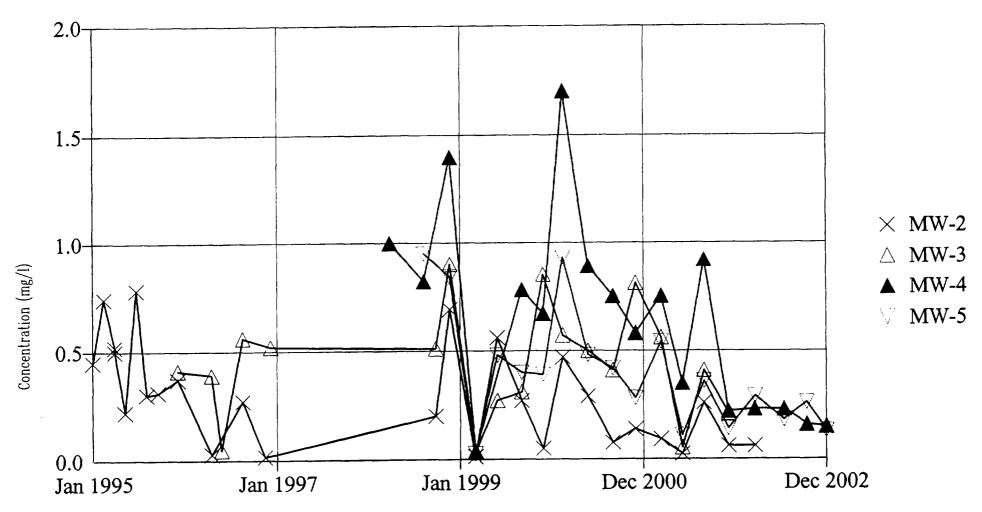
Constituent: Arsenic (mg/l)

Date: 2/20/03, 4:47 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



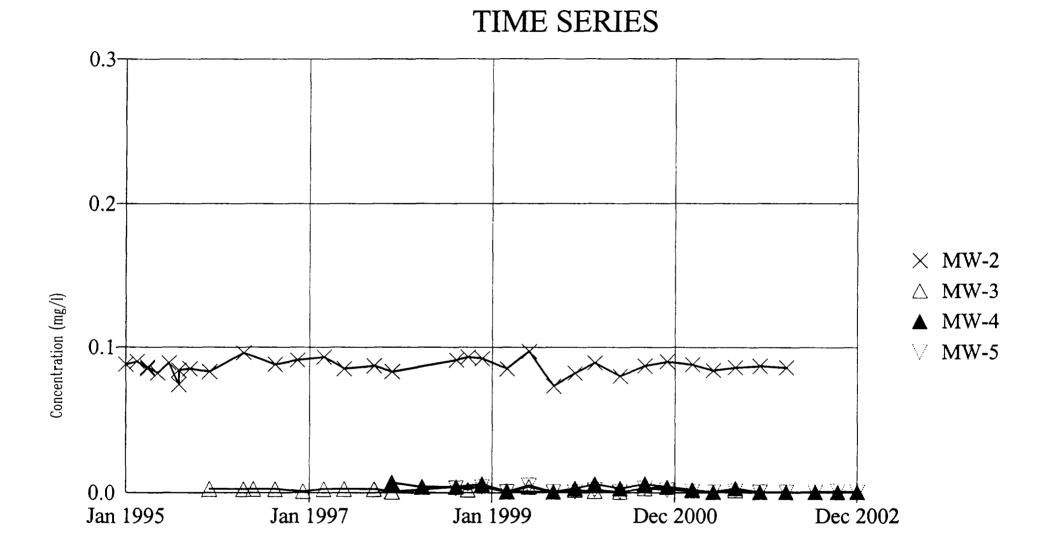
Constituent: Barium (mg/l)

Date: 2/20/03, 4:48 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



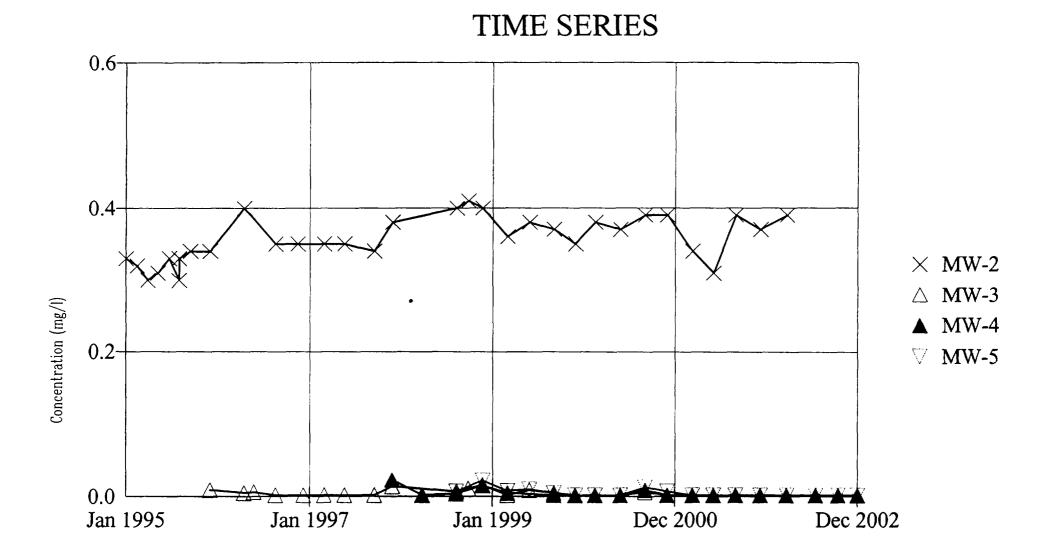
Constituent: Beryllium (mg/l)

Date: 2/20/03, 4:49 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Cadmium (mg/l)

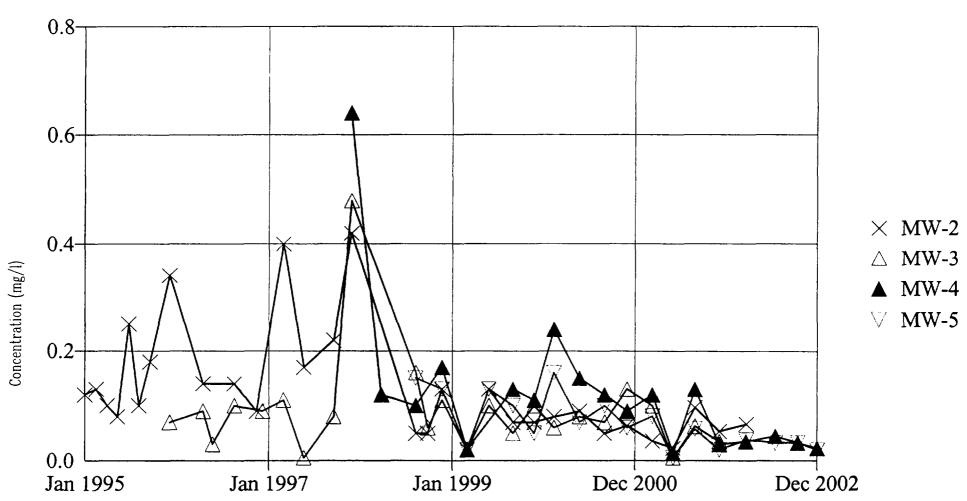
Date: 2/20/03, 4:50 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





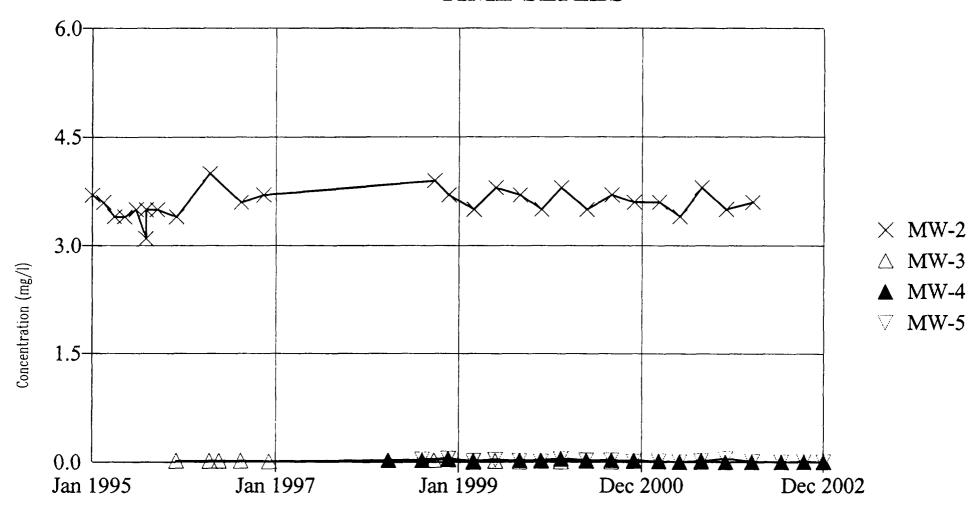
Constituent: Chromium (mg/l)

Date: 2/20/03, 4:51 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



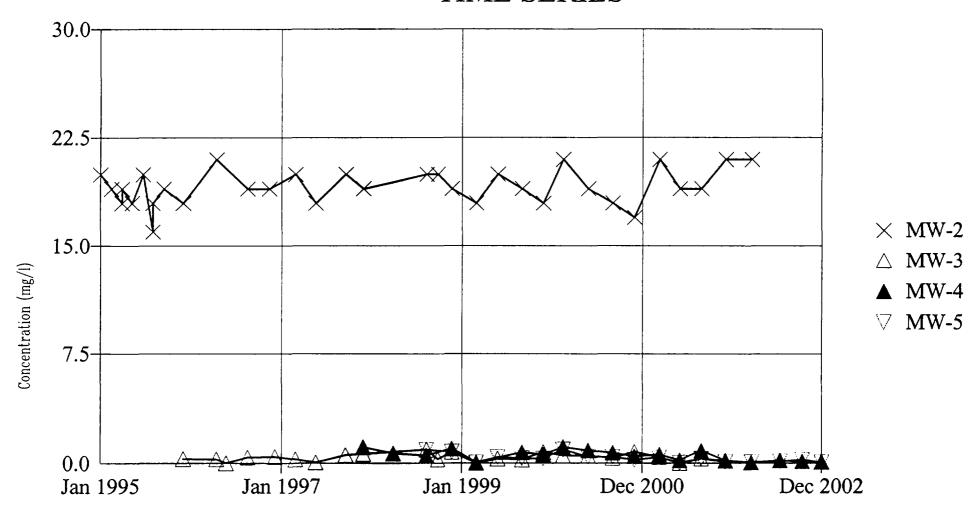
Constituent: Cobalt (mg/l)

Date: 2/20/03, 4:51 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



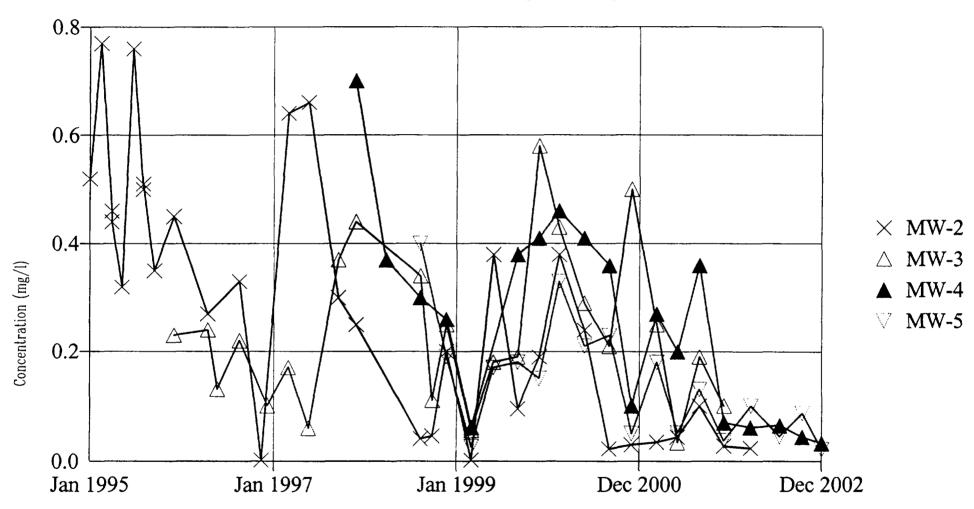
Constituent: Copper (mg/l)

Date: 2/20/03, 4:52 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



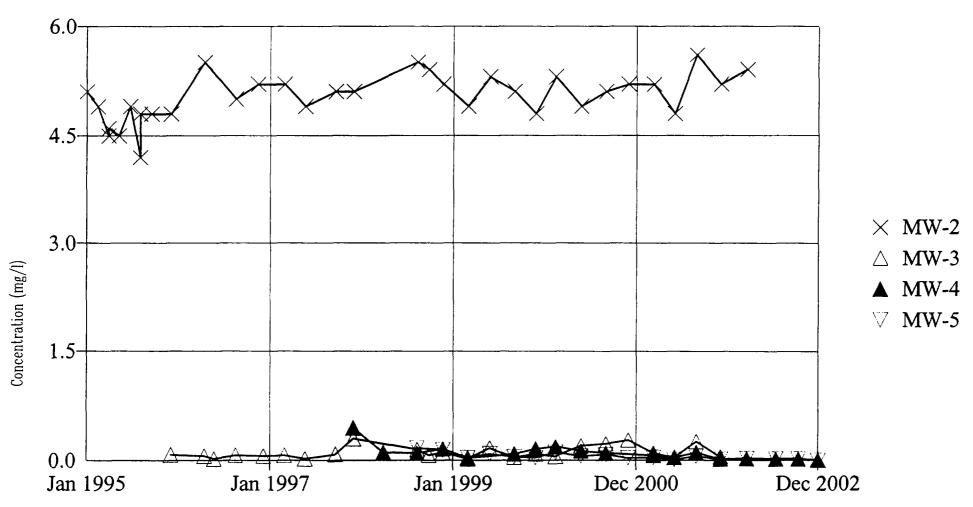
Constituent: Lead (mg/l)

Date: 2/20/03, 4:53 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Nickel (mg/l)

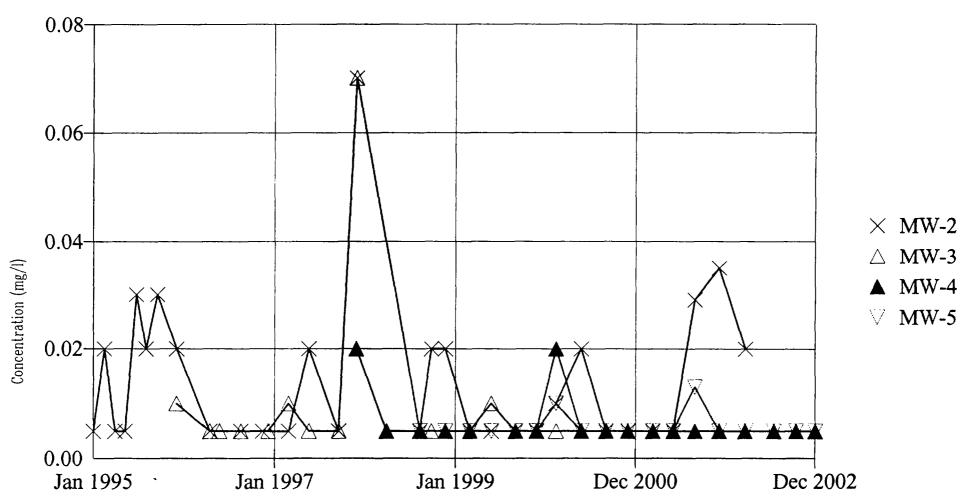
Date: 2/20/03, 4:53 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





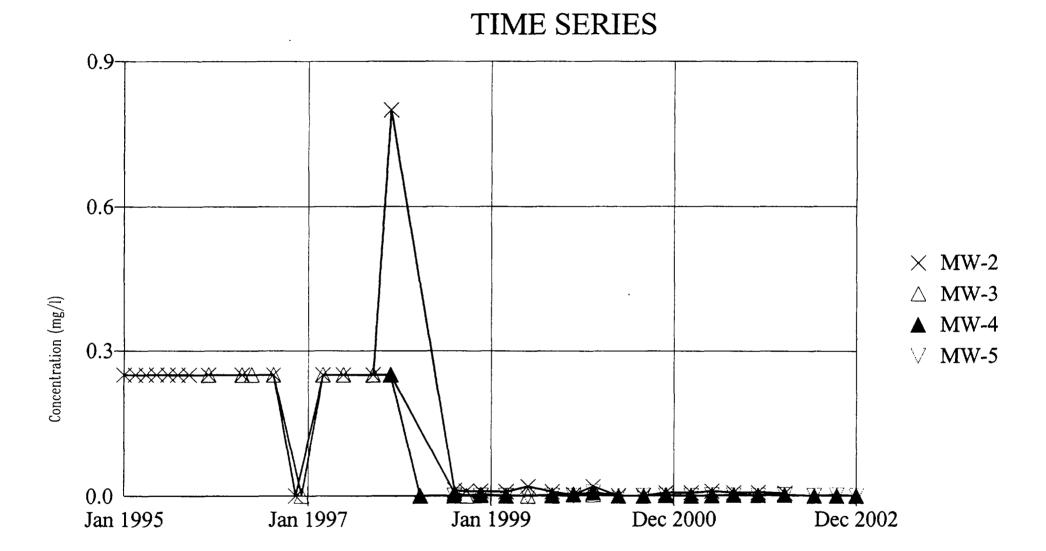
Constituent: Silver (mg/l)

Date: 2/20/03, 4:54 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



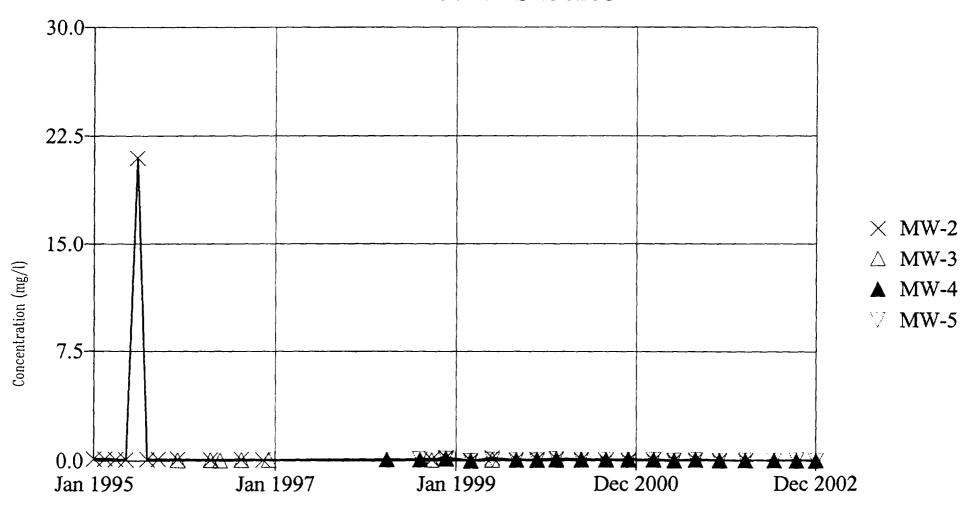
Constituent: Thallium (mg/l)

Date: 2/20/03, 4:54 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Vanadium (mg/l)

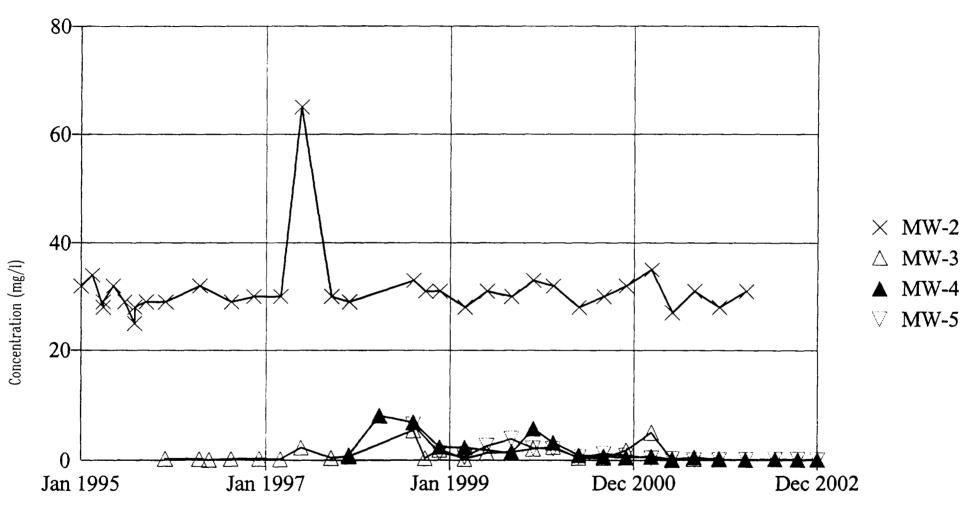
Date: 2/20/03, 4:55 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





Constituent: Zinc (mg/l)

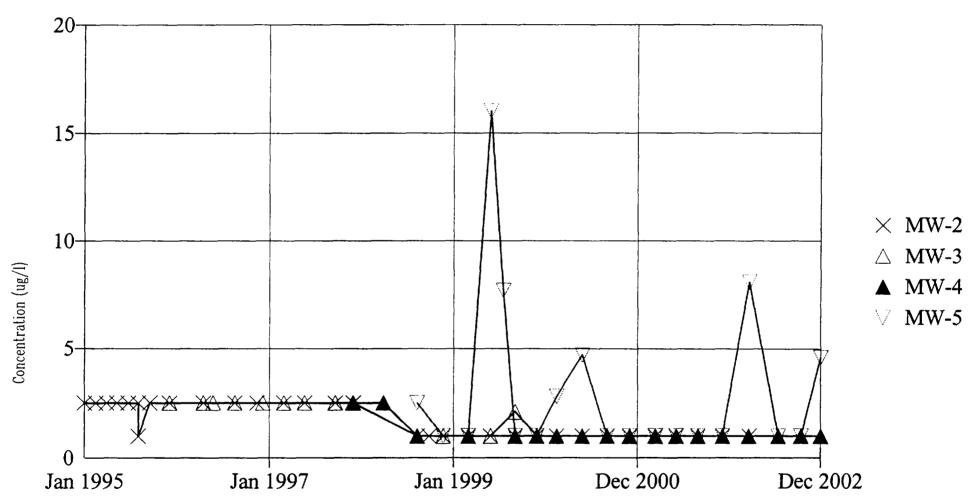
Date: 2/20/03, 4:56 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





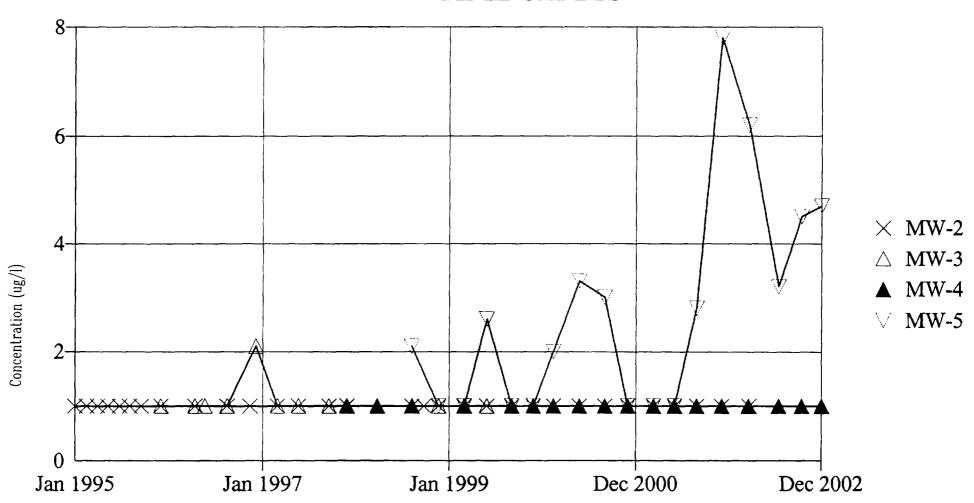
Constituent: Chloroethane (ug/l)

Date: 2/20/03, 4:57 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



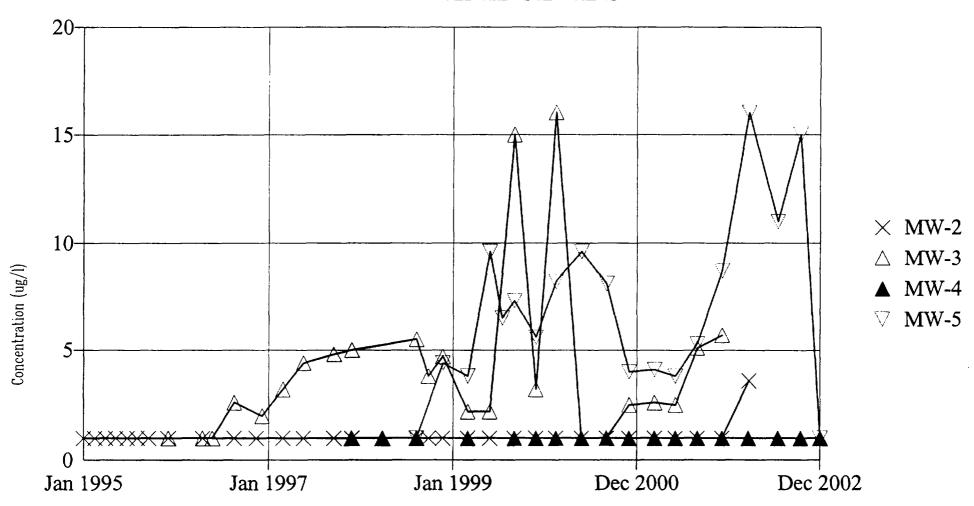
Constituent: 1,1-Dichloroethene (ug/l)

Date: 2/20/03, 4:58 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



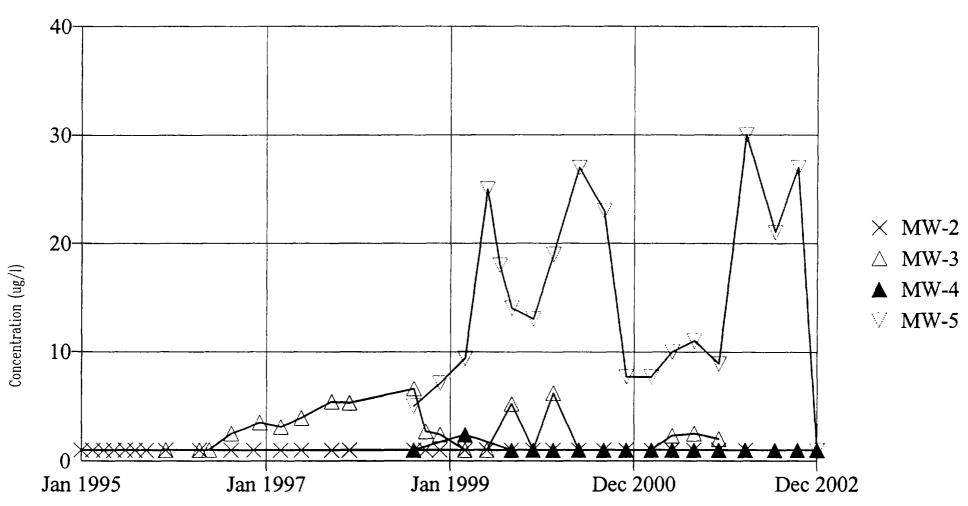
Constituent: Tetrachloroethene (ug/l)

Date: 2/20/03, 4:58 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



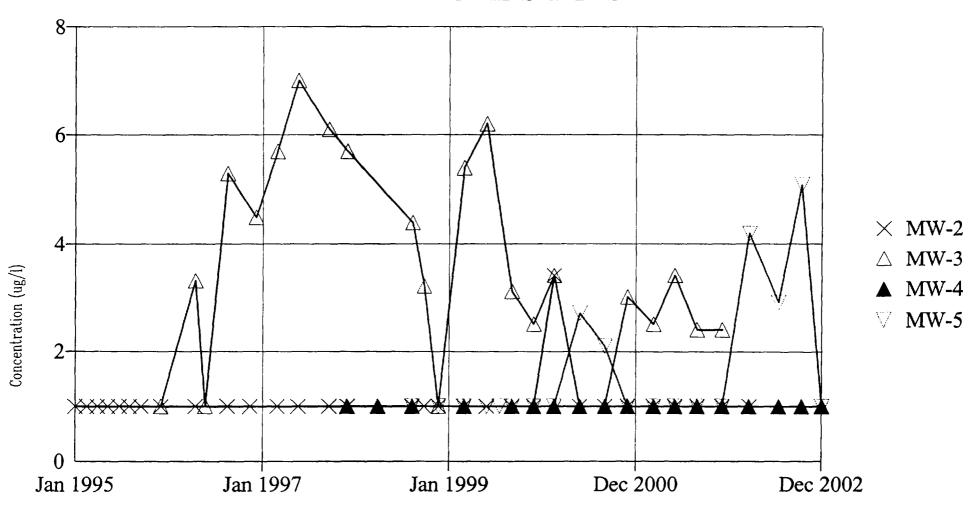
Constituent: 1,1,1-Trichloroethane (ug/l)

Date: 2/20/03, 4:59 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



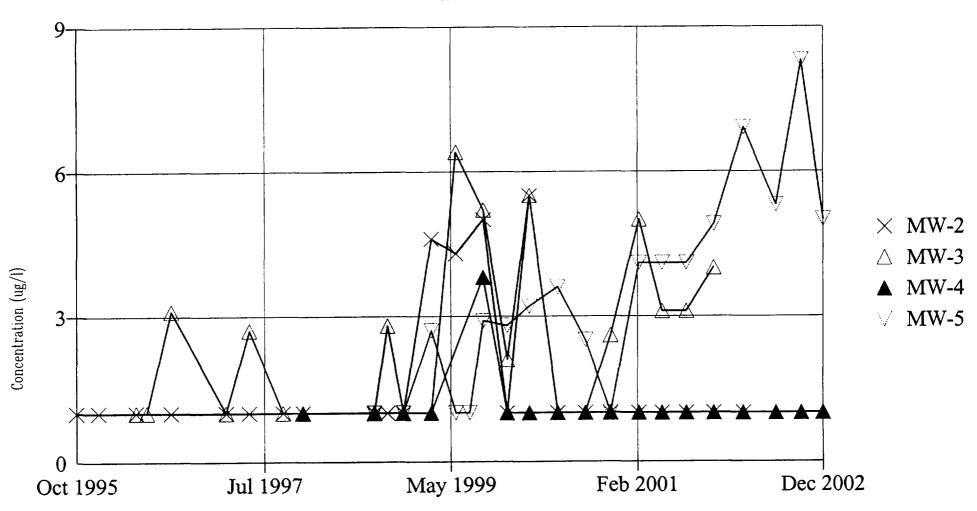
Constituent: Trichlorofluoromethane (ug/l)

Date: 2/20/03, 4:59 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Dichlorodifluoromethane (ug/l)

Date: 2/20/03, 5:00 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw

Appendix C

(2002 Groundwater Monitoring Report)

Constituent: Tetrachloroethene (ug/l)

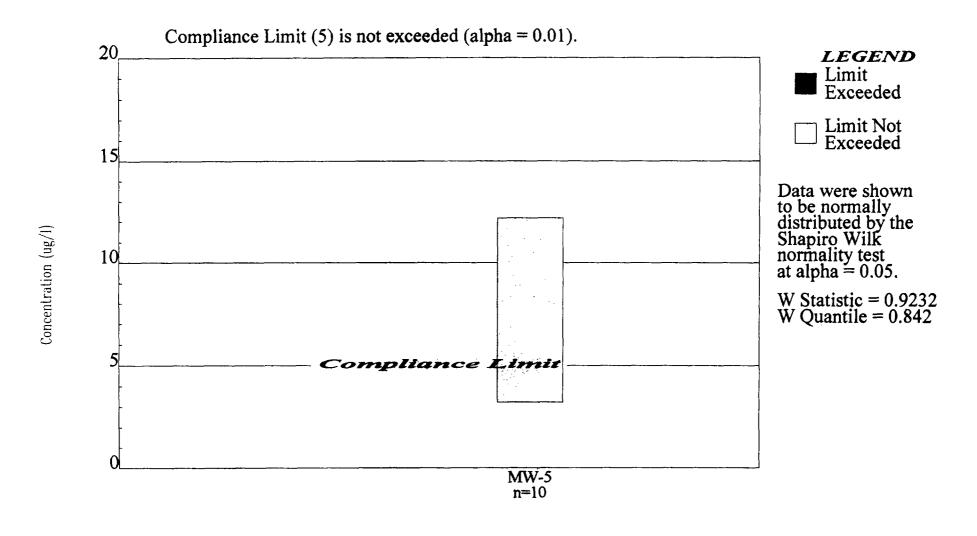
Date: 2/20/03, 4:29 PM

CONFIDENCE INTERVAL

Facility: Trans-Jordan-Cities/

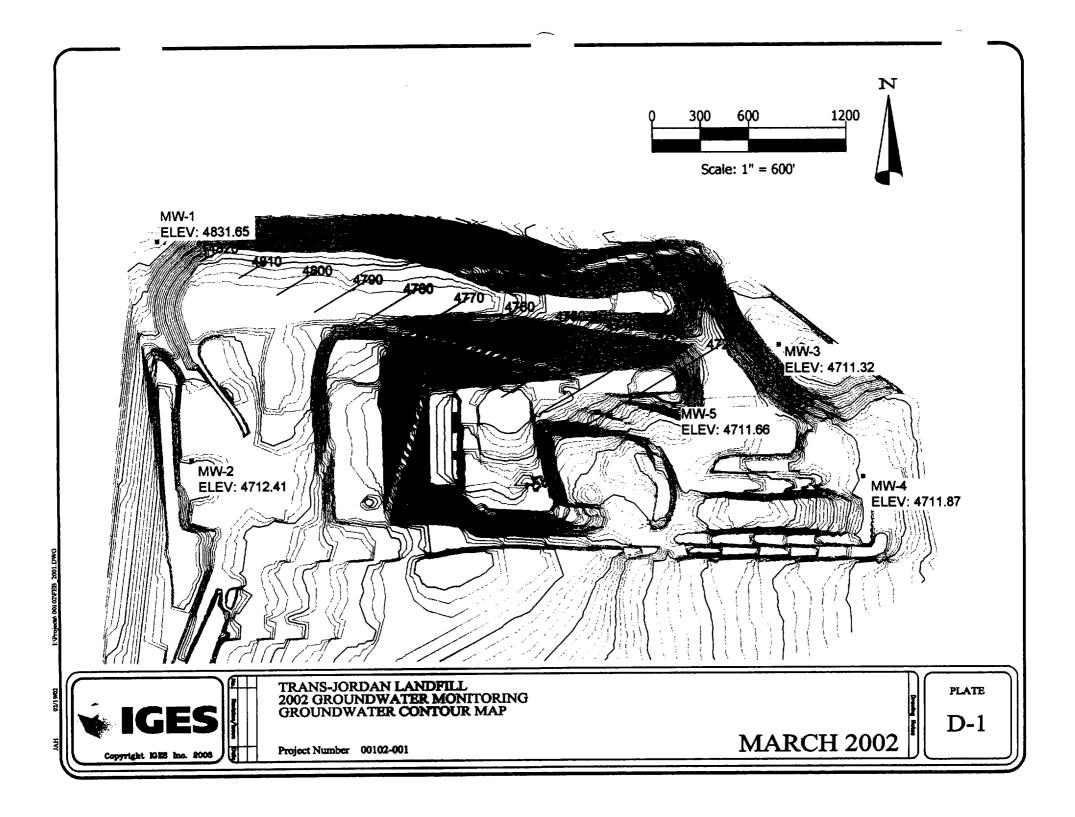
Client: IGES

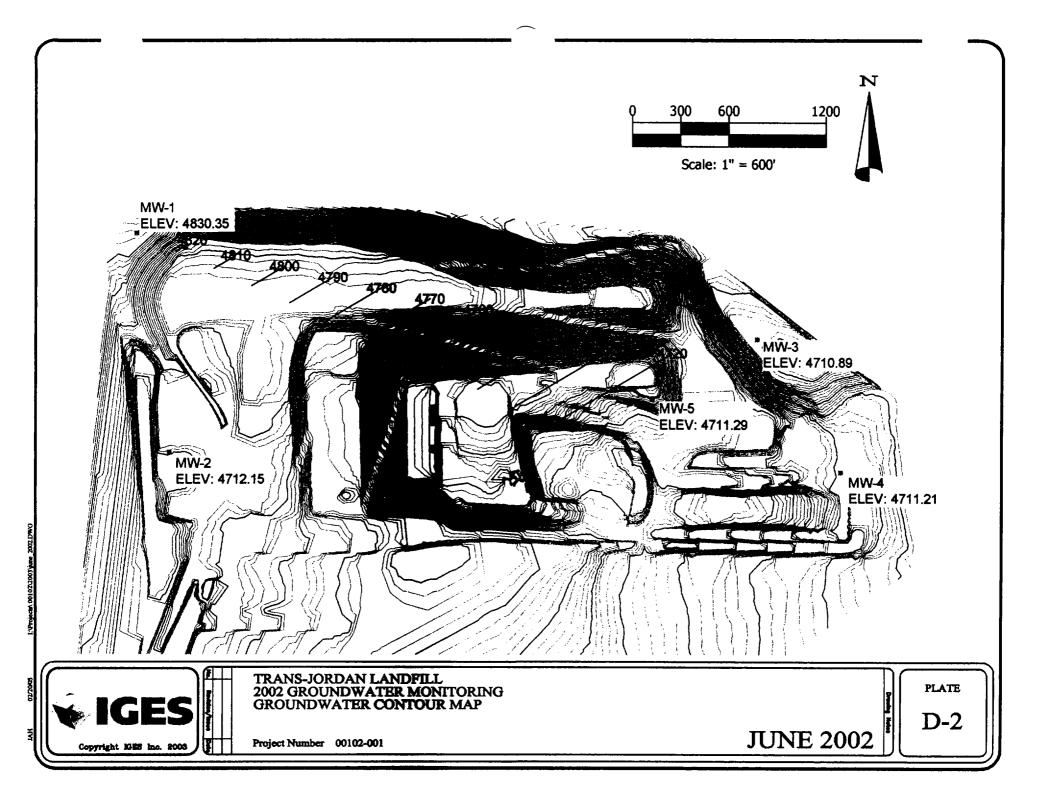
Data File: 2002gw

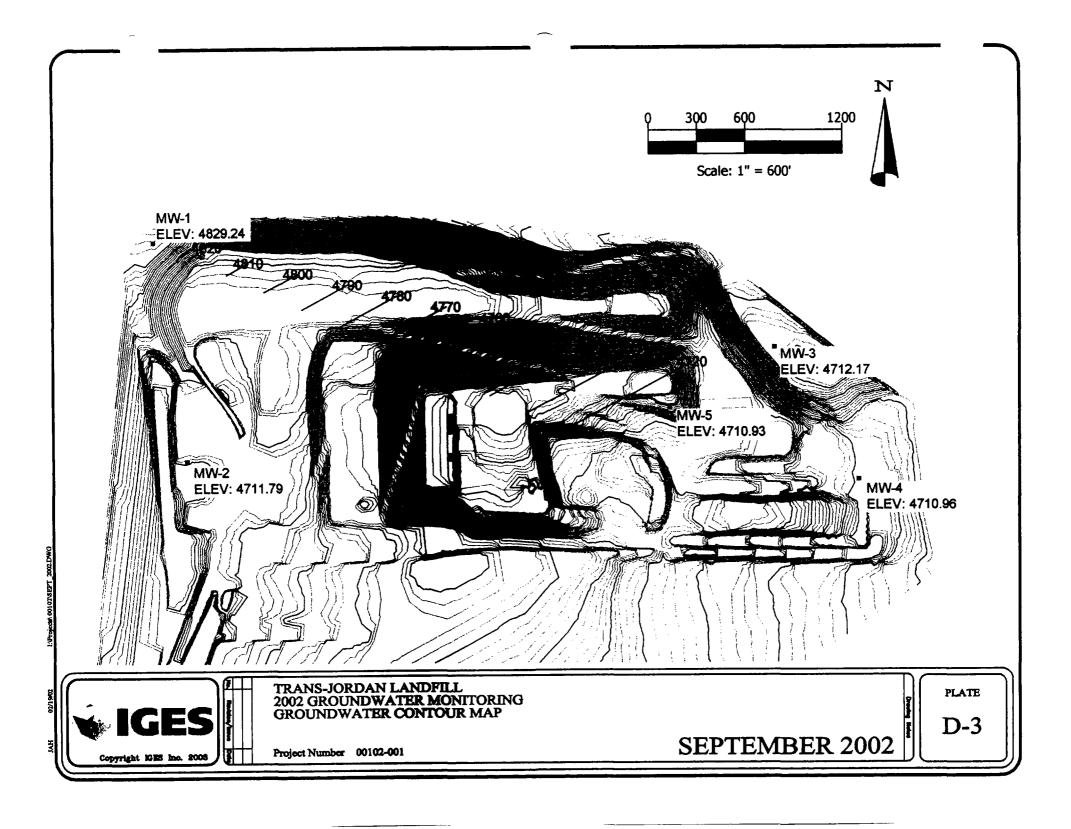


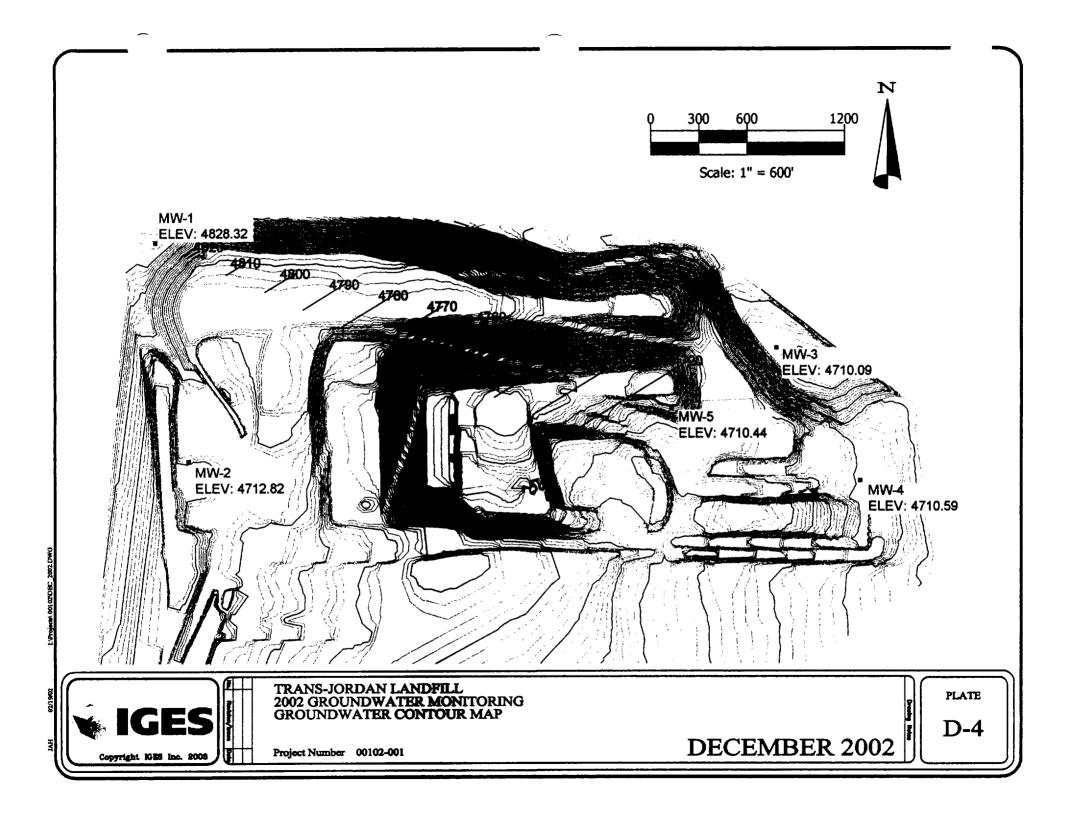
Appendix D

(2002 Groundwater Monitoring Report)











Well Identification:

TJMW-1

Northing:

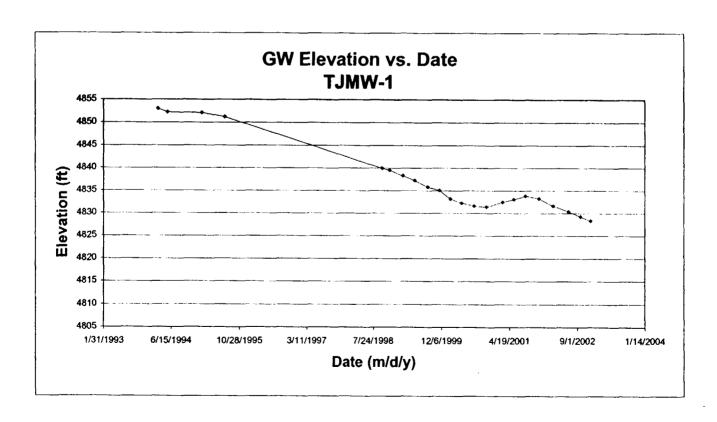
811,849.27 1,844,080.58 5129.16

315.00

Rorting:
Easting:
Well Casing Elevation (ft):
Well Depth (ft):
Well Bottom Elevation (ft):

4814.16

Measurement	Groundwater	Groundwater	Column	Purge Volume	Final pH	Final	Final
Date (m/d/y)	Depth (ft)	Elevation (ft)	of Water (ft)	(gals)	(pH units)	Conductivity (mmhos)	Temperature (°C
3/11/1994	276.20	4852.96	38.80	375	7.37	1800	12.6
5/20/1994	276.94	4852.22	38.06	75	7.15	1600	12.3
1/25/1995	277.10	4852.06	37.90	75	6.99	1800	11.3
7/14/1995	278.00	4851.16	37.00	80	6.87	2000	16.7
9/28/1998	289.21	4839.95	25.79		-		-
11/23/1998	289.63	4839.53	25.37	•	•		-
3/1/1999	290.85	4838.31	24.15			†- -	
5/26/1999	291.92	4837.24	23.08		·		
8/30/1999	293.37	4835.79	21.63	•		·	-
11/22/1999	294.10	4835.06	20.90			·	-
2/8/2000	295.98	4833.18	19.02	-	-	·	
5/1/2000	296.92	4832.24	18.08			1	
8/1/2000	297.55	4831.61	17.45	-	-		
11/1/2000	297.75	4831.41	17.25	-			-
2/28/2001	296.73	4832.43	18.27	•		· · · · · · · · · · · · · · · · · · ·	
5/21/2001	296.09	4833.07	18.91	•			-
8/15/2001	295.32	4833.84	19.68			-	
11/20/2001	295.95	4833.21	19.05	-	-	 	
3/5/2002	297.51	4831.65	17.49				
6/28/2002	298.81	4830.35	16.19			<u> </u>	
9/24/2002	299.92	4829.24	15.08				
12/10/2002	300.84	4828.32	14.16				





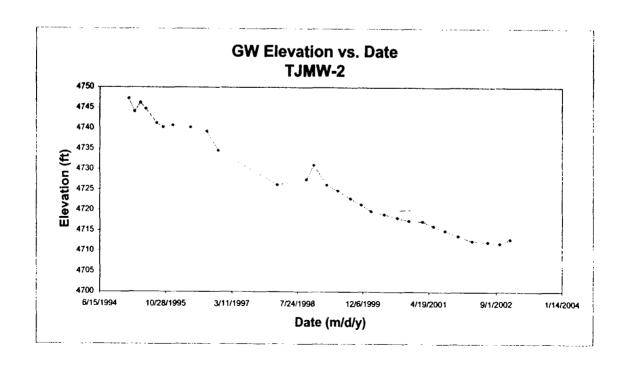
TJMW-2 810,469.10 1,844,286.68 5167.77 455 4712.77

(Well Casing Extended, 2/8/00)

Well Identification: Northing: Easting: Well Casing Elevation (ft): Well Depth (ft): Well Bottom Elevation (ft):

5170.10 457.33 4712.77

Measurement	Groundwater	Groundwater	Column	Purge Volume	Final pH	Final	Final
Date (m/d/y)	Depth (ft)	Elevation (ft)	of Water (ft)	(gals)	(pH units)	Conductivity (mmhos)	Temperature (*C
1/24/1995	420.50	4747.27	34.50	350	3.89	7400	11.5
3/9/1995	423.70	4744.07	31.30	90	3.45	6900	12.9
4/21/1995	421.50	4746.27	33.50	85	3.57	8300	16.7
5/31/1995	423.00	4744.77	32.00	85	3.61	7400	17.6
8/22/1995	426.50	4741.27	28.50	80	3.6	6900	19.8
10/5/1995	427.50	4740.27	27.50	90	3.48	7200	13.7
12/20/1995	427.00	4740.77	28.00	75	3.71	6600	11.2
4/29/1996	427.50	4740.27	27.50	75	3.51	7200	16.5
8/30/1996	428.50	4739.27	26.50	70	3.53	4900	22.8
11/25/1996	433.20	4734.57	21.80	60	3.42	3600	10.0
2/15/1998	441.57	4726.20	13.43	45	4.04	6900	14.5
9/28/1998	440.28	4727.49	14.72	48	3.87	6950	15.0
11/23/1998	436.75	4731.02	18.25	30	3.96	6900	14.8
3/1/1999	441.62	4726.15	13.38	30	3.96	6900	14.8
5/26/1999	443.05	4724.72	11.95	45	3.96	6925	15.2
8/30/1999	444.92	4722.85	10.08	30	3.71	6640	15.3
11/22/1999	446.43	4721.34	8.57	50	3.86	7015	11.7
2/8/2000	450.37	4719.73	6.96	36	3.68	6920	14.4
5/18/2000	451.16	4718.94	6 17	33	3.61	6920	15.0
8/24/2000	451.98	4718.12	5.35	50	3.61	6710	15.8
11/20/2000	452.77	4717.33	4.56	38	3.76	6620	12.8
2/28/2001	452.88	4717.22	4.45	50	3.51	6580	13.7
5/21/2001	454.07	4716.03	3.26	47	3.59	6110	14.7
8/15/2001	455.15	4714.95	2.18	44	3.64	5950	16.1
11/20/2001	456.45	4713.65	0.88	9 (dry)	3.12	6240	13.8
3/5/2002	457.69	4712.41	-0.36	7.75 (dry)	4.61	6440	14.2
6/28/2002	457.95	4712.15	-0.62	dry		 	17.4
9/24/2002	458.31	4711.79	-0.98	dry			
12/10/2002	457.28	4712.82	0.05	dry			
						 	





Well Identification:

TJMW-3

Northing:

811,183.26

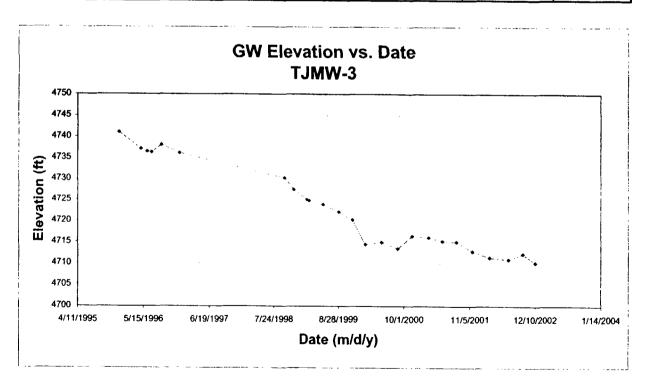
1,847,938.86 5029.77

(Well Casing Extended 2/8/00)

Easting:
Well Casing Elevation (ft):
Well Depth (ft):
Well Bottom Elevation (ft):

5033.63 322.86 4710.77 4710.77

Measurement	Groundwater	Groundwater	Column	Purge Volume	Final pH	Final	Final
Date (m/d/y)	Depth (ft)	Elevation (ft)	of Water (ft)	(gals)	(pH units)	Conductivity (mmhos)	
12/20/1995	288.73	4741.04	30.27	80	7.59	2800	9.5
4/29/1996	292.65	4737.12	26.35	75	7.25	3200	12.8
6/6/1996	293.28	4736.49	25.72	75	7.4	3100	19.8
7/3/1996	293.44	4736.33	25.56	75	7.34	2400	18.3
8/30/1996	291.75	4738.02	27.25	75	7.14	2200	17.5
12/18/1996	293.64	4736.13	25.36	70	7.21	2100	11.5
9/28/1998	299.55	4730.22	19.45	72	6.79	3270	13.6
11/23/1998	302.32	4727.45	16.68	53	7.33	3280	12.4
2/15/1999	304.72	4725.05	14.28	55	7.47	3250	12.2
3/1/1999	304.96	4724.81	14.04	34	7.48	3260	12.1
5/26/1999	305.88	4723.89	13.12	55	7.49	3230	12.9
8/30/1999	307.64	4722.13	11.36	45	7.11	3190	13.2
11/22/1999	309.54	4720.23	9.46	45	6.89	3270	11.7
2/8/2000	315.37	4718.26	7.49	22 (dry)	7.15	3240	12.2
5/18/2000	314.85	4718.78	8.01	26	7.21	3260	13.1
8/24/2000	316.34	4717.29	6.52	25	7.68	3130	14.8
11/20/2000	317.27	4716.36	5.59	25	6.57	3140	11,7
2/28/2001	317.58	4716.05	5.28	50	6.87	3130	11.7
5/21/2001	318.47	4715.16	4.39	39	6.81	3000	12.7
8/15/2001	318.63	4715.00	4.23	3 (dry)	7.01	3040	16.7
11/20/2001	320.84	4712.79	2.02	15 (dry)	7.23	3025	12.4
3/5/2002	322.31	4711.32	0.55	dry			
6/28/2002	322.74	4710.89	0.12	dry			
9/24/2002	321.46	4712.17	1.40	dry			
12/10/2002	323.54	4710.09	-0.68	dry			· · · · · · · · · · · · · · · · · · ·





Well Identification:

TJMW-4

Northing:

810,352.05 1,848,456.17

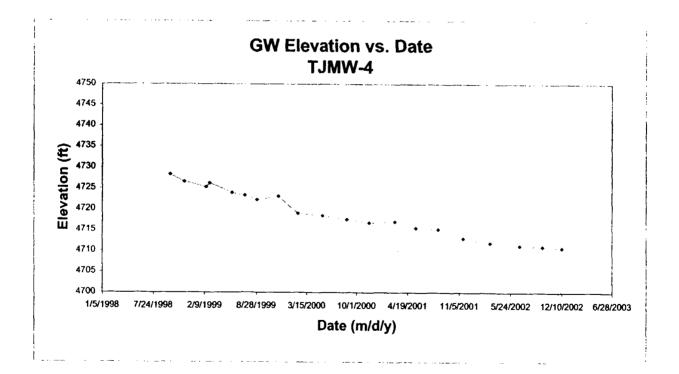
5071.43

365

Easting:
Well Casing Elevation (ft):
Well Depth (ft):
Well Bottom Elevation (ft):

4706.43

Measurement	Groundwater	Groundwater	Column	Purge Volume	Final pH	Final	Final
Date (m/d/y)	Depth (ft)	Elevation (ft)	of Water (ft)	(gals)	(pH units)	Conductivity (mmhos)	
9/28/1998	343.15	4728.28	21.85				
11/23/1998	344.84	4726.59	20.16	55	6.71	3110	12.5
2/15/1999	346.15	4725.28	18.85	45	7.47	3000	12.3
3/1/1999	345.21	4726.22	19.79	44	6.54	3260	12.5
5/26/1999	347.53	4723.90	17.47				
7/14/1999	348.12	4723.31	16.88	-		·	
8/30/1999	349.21	4722.22	15.79	36	6.50	2870	13.4
11/22/1999	348.37	4723.06	16.63	38	6.09	2830	11.9
2/8/2000	352.48	4718.95	12.52	44	7.02	2970	12.6
5/18/2000	353.03	4718.40	11.97	38	6.13	3000	13.0
8/24/2000	353.91	4717.52	11.09	52	7.17	3030	13.6
11/20/2000	354.71	4716.72	10.29	38	6.77	3040	12.6
2/28/2001	354.45	4716.98	10.55	55	6.88	3030	12.3
5/21/2001	355.96	4715.47	9.04	38	6.69	2900	13.2
8/15/2001	356.28	4715.15	8.72	50	7.16	2890	14
11/20/2001	358.47	4712.96	6.53	38	7.2	2925	13
3/5/2002	359.56	4711.87	5.44	29	7.22	2970	12.3
6/28/2002	360.22	4711.21	4.78	25	7,16	2890	15.1
9/24/2002	360.47	4710.96	4.53	19	7.19	3000	13.1
12/10/2002	360.84	4710.59	4.16	36	7.13	2840	12.1





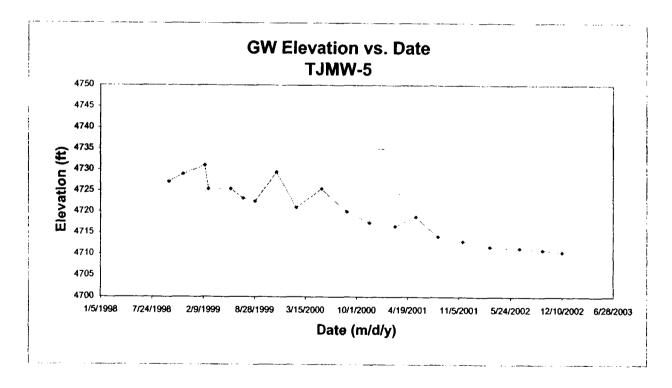
Well Identification:

TJMW-5 810,800.56 1,847,286.96 5070.9 365

Well Identification:
Northing:
Easting:
Well Casing Elevation (ft):
Well Depth (ft):
Well Bottom Elevation (ft):

4705.9

Measurement Date (m/d/y)	Groundwater Depth (ft)	Groundwater Elevation (ft)	Column of Water (ft)	Purge Volume (gals)	Final pH (pH units)	Final Conductivity (mmhos)	Final Temperature (°C
9/28/1998	343.81	4727.09	21.19	(gais)	(pri units)	Conductivity (minnos)	remperature (C
11/23/1998	341.96	4728.94	23.04	52	7.11	3730	12.5
2/15/1999	339.85	4731.05	25.15	53	6.88	3710	12.5
3/1/1999	345.51	4725.39	19.49	42	7.13	3760	12.2 12.2
5/26/1999	345.51	4725.39	19.49	52	6.98	3760	12.9
7/14/1999	347.72	4723.18	17.28	45	6.97	3760	13.2
8/30/1999	348.46	4722.44	16.54	52	7.08	3750	13.0
11/22/1999	341.47	4729.43	23.53	52	6.59	3730	11,8
2/8/2000	349.92	4720.98	15.08	48	6.75	3775	12.0
5/18/2000	345.47	4725.43	19.53	52	6.63	3780	12.8
8/24/2000	350.92	4719.98	14.08	55	6.94	3710	14.7
11/20/2000	353.53	4717.37	11.47	55	6.16	3600	12.0
2/28/2001	354.41	4716.49	10.59	48	6.37	3590	11.7
5/21/2001	352.14	4718.76	12.86	50	6.7	3500	12.1
8/15/2001	356.81	4714.09	8.19	52	6.23	3420	13.3
11/20/2001	357.97	4712.93	7.03	38	6.82	3420	12.7
3/5/2002	359.24	4711.66	5.76	38	7.46	3570	12.9
6/28/2002	359.61	4711.29	5.39	35	6.82	3590	13.4
9/24/2002	359.97	4710.93	5.03	32	7	3650	13.1
12/10/2002	360.46	4710.44	4.54	53	6.99	3500	12.1



NOTICE

Trans-Jordan Cities has submitted to the Division of Solid and Hazardous Waste a Corrective Action Plan "Plan" in regard to their Class I municipal landfill located approximately 1.5 miles east of Copperton along Highway 111 in South Jordan City. (10873 S 7200 West). The Plan has been reviewed by the Division of Solid and Hazardous Waste and has been found to be acceptable to go to public comment. The public comment period on this Plan begins September 29, 2003 and will end October 29, 2003. A public information meeting will be held on October 22 at 6:00 p.m. in the Community Room at Fire Station 2, located at 4022 W 10400 South, South Jordan.

Copies of the Plan are available for public review during the comment period during normal business hours at the following locations:

Trans-Jordan Landfill office: 10873 S. 7200 West South Jordan UT 84095

Utah Department of Environmental Quality 288 North 1460 West, 4th Floor Salt Lake City, Utah

They also can be viewed on the Internet at http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.gov/hpc-1 http://www.hazardouswaste.utah.

Written comments will be accepted if received by 5:00 PM on October 29, 2003 and should be submitted to:

Dwayne Woolley, General Manager Trans-Jordan Cities 10873 S. 7200 West PO Box 95610 South Jordan UT 84095-0610

Comments can also be sent by electronic mail to: gm-landfill@qwest.net. Comments sent in electronic format should be identified by putting the following in the subject line: public comment on Plan. All documents included in comments should be submitted as ASCII (text) files.

For further information contact Dwayne Woolley of Trans-Jordan Cities at (801) 569-8994, or Brett Mickelson, P.E., of IGES, Inc., at (435) 649-7344.

Posted in both the Morning Deseret News and Salt Lake Tribune on September 21 & 28, 2003

APPENDIX D – STORM WATER POLLUTION PREVENTION PLAN





Dianne R. Nielson, Ph.D. Executive Director Don A. Ostler, P.E. DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF WATER QUALITY

288 North 1460 West P.O. Box 144870 Salt Lake City, Utah 84114-4870 (801) 538-6146 (801) 538-6016 Fax (801) 536-4414 T.D.D. www.deq.state.ut.us Web

December 23, 1998

RECEIVED JAN 1 1 1999 Leroy H. Wullstein, Ph.D.
Chairman

Lynn F. Pett
Vice Chairman

Robert G. Adams
R. Rex Ausburn, P.E.
Nan Bunker
Leonard Ferguson
Dianne R. Nielson, Ph.D.
K.C. Shaw, P.E.
Ronald C. Sims, Ph.D.
J. Ann Wechsler
William R. Williams
Don A. Ostler, P.E.
Executive Secretary

Water Quality Board

Mr. Dwayne Woolley Trans Jordan Cities Landfill PO Box 95610 South Jordan, Utah 84095-5610

Dear Mr. Woolley:

Subject:

Storm Water Permit; Permit No. UTR000109

Enclosed is your official copy of the General Multi-Sector Permit for Storm Water Discharges Associated with Industrial Activity. You have been assigned Permit UTR000109. Please refer to this number in all future correspondence.

To reduce delays the permit has been drafted to cover facilities and authorize storm water discharges automatically upon submission of the notice of intent (NOI) and payment of fees. This may cause some facilities to acquire coverage and be responsible for permit conditions before obtaining a copy of the permit. A Storm Water Pollution Prevention Plan (SWP3) is required in this permit. Maintaining a current copy of the SWP3 at the site is a compliance condition of this permit. Visual or analytical monitoring is also required. Please review the portion of the permit that contains these compliance issues if you are unfamiliar with them so that you can avoid compliance and enforcement problems.

Storm water discharge monitoring report (SWDMR) forms are enclosed for you to record your monitoring results. Remember, analytical monitoring must be submitted, visual monitoring must be filed in your storm water files. If you are not required to do analytical monitoring you may use the enclosed forms for recording your visual storm water monitoring for your own files.

In order to better handle the work load we have issued coverage so that different sectors will expire each year for five years. Group 5 includes your sector (sectors J, K, L, N, O, Q, S, V, Y, and X), in group 5 you will need to submit a renewal NOI by December 1, 2002. If you have any questions please call me at 538-6923.

Sincerely,

Harry Campbell, P.E., Environmental Engineer

Permits & Compliance Section

HC:hdc/st Enclosure

cc:

Terry Way, Salt Lake County Public Works (NOI/encl)
Terry Sadler, Salt Lake City/County Health Dept. (NOI/encl)

Permit No.: UTR000000

STATE OF UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF WATER QUALITY SALT LAKE CITY, UTAH 84114-4870

Authorization to Discharge Under the Utah Pollutant Discharge Elimination System

General Multi-Sector Permit for Storm Water Discharges Associated with Industrial Activity

In compliance with the provisions of the *Utah Water Pollution Control Act, Title 19, Chapter 5, Utah Code Annotated ("UCA") 1953*, as amended (the *Act*),

TRANS JORDAN CITIES LANDFILL

is authorized to discharge from the industrial site identified in the Notice of Intent, application number UTR000109 to Bingham Creek in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein.

Coverage under this permit became effective on January 1, 1998.

This permit and the authorization to discharge shall expire at midnight, December 31, 2002.

Signed this 23th day of December, 1998.

Authorized Permitting Official

Executive Secretary

Utah Water Quality Board

STATE OF UTAH, DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY 288 North 1460 West, P.O. Box 144870, Salt Lake City, Utah 84114-4870 (801)538-6146
STATE OF UTAH Notice of Intent (NOI) for Coverage Under the UPDES General Multi-Sector Storm Water Permit for Discharges NOI FORM Associated with Industrial Activity, Permit No. UTR000000. INSTRUCTIONS ON BACK PAGE
Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a UPDES permit issued for storm water discharges associated with industrial activity in the State of Utah. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit. ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM. A different Soft form is provided for measurance octaining disarrhing over 5 cores.
I. FACILITY OPERATOR INFORMATION
Name: Trans Jordan Cities Landfill Phone: 801 569-8949
P.O. Box 95610 10873 South 7200 West Address: Status of Owner/Operator: M
City: \$quith Joir # 4 7
Facility Contact Person: Dwayrge Woolfey
Facility Contact Person Title: General Manager
II. FACILITY SITE/LOCATION INFORMATION Is the facility located on Indian Lands?
Name: Trans Jondan Giries Landfill
Address: 10873 South 7200 West Salt Lake
City: South Jordan
Latitude: Longitude: Quarter: Section: Township: Range:
Site Contact Person: Dwayne Woolley
Site Contact Person Title: [General Manager
III. SITE ACTIVITY INFORMATION
Name of Municipality which Operates the Storm Sewer System: Salt Lake
Receiving Waser Body: Bingham Creek
Yes No
Is there existing quantitative storm water discharge data?
Is the facility required to do analytical monitoring? (See permit conditions Part V. and Sector monitoring requirements.)
Is the facility required to do visual monitoring? (See permit conditions near the end of applicable Sector(s); Appendix A to AD)
Is the facility required to submit monitoring data or remain it on site? (Submit) (Retain on site)
Is This a New Facility, or is it an Existing Facility? (New) (Existing)
If This is an Existing Facility, and the Start-up Date was After Oct. 1992, Please Fill in the Start-up Month; Month (Jan. Feb., etc.):

AV. SECTOR IDENTIFICATION: The General Multi-Sector Permit covers all industrial activity that is required by law to be covered by a storm water permit. On the following pages the sectors are listed with a description of the industrial activity that is covered by that sector. Please check each sector that covers industrial activities which occur at your site. The sector covered in Appendix AD is the catch-all sector and should only be used if positively no other sector covers your industrial activity. If you should select AD, please call the Storm Water Coordinator at DWQ to discuss the need for choosing Sector AD (Non-Classified Facilities).

If You Have Other Existing UPDES Permits, Enter Permit #s: 111

	A. Timber Products Facilities - establishments (generally classified under Standard Industrial Classification (SIC) Major Group 24) that are engaged in cutting timbs
	and pulpwood, merchant seemills, lath mills, shingle mills, cooperage stock mills, planing mills, and plywood and veneer mills engaged in producing lumber and wood basic materials; and establishment engaged in wood preserving or in manufacturing finished armies made entirely of wood or related materials, except for wood kitchen cabinet manufacturers (SIC Code 2434), which are addressed under sector W.
	B. Paper and Allied Products Manufacturing Facilities facilities engaged in the manufacture of pulps from wood and other cellulose fibers and from rags; the
	manufacture of paper and paperboard into converted products, such as paper coated off the paper machine, paper bags, paper boxes and envelopes; and establishments primarily engaged in manufacturing bags of plastic film and sheet. These facilities are commonly identified by Standard Industrial Classification (SIC) Major Group 26.
	C. Chemical and Allied Products Manufacturing Facilities - 1) Basic industrial inorganic chemicals (including SIC 281), 2) Plastic materials and synthetic resins.
	synthetic rubbers, and cellulasic and other humanmade fibers, except glass (including SIC 282). 3) Soap and other detergents and in producing glycerin from vegetable and animal fats and oils; specially cleaning, polishing, and sanitation preparations; surface active preparations used as emulsifiers, wetting agents, and finishing agents, including sulfonated oils; and perfurnes, cosmetics, and other toilet preparations (including SIC 284). 4) Paints (in paste and ready-mixed form); varnishes; lacquers; enamels and shellad purties, wood fillers, and sealers; paint and varnish removers; paint brush cleaners; and allied paint products (including SIC 285). 5) Industrial organic chemicals (including SIC 286). 6) Nitrogenous and phosphatic basic fertilizers, mixed fertilizer, pesticides, and other agricultural chemicals (including SIC 287), 7) Industrial and household adhesives, glues, caulking compounds, sealants, and linoleum, tile, and robber cements from vegetable, animal, or synthetic plastics materials; explosives; printing ink, including gravure ink, screen process ink, and Ethographic; miscellaneous chemical preparations, such as farty acids, essential cils, gelatin (except vegetable), sizes, bluing, laundry sours, writing and stamp paid ink, industrial compounds, such as boiler and heat insulating compounds, metal, oil, and water treatment compounds, waterproofing compounds, and chemical supplies for foundries (including facilities with SIC 289), 8) Ink and paints, including china painting enamels, india ink, drawing ink, plannum paints for burnt wood or leather work, paints for china painting artists' paints and artists' water colors (SIC 3952, limited to those listed; for others see sector Y.), 9) Medicinal chemicals and pharmaceutical products, including the grading grinding and milling of boxanicals (including SIC 283).
	D. Asphalt Paving, Roofing Materials, and Lubricant Manufacturing Facilities - 1) facilities engaged in manufacturing asphalt paving and roofing materials.
	including those facilities corrationly identified by Standard Industrial Classification (SIC) codes 2951 and 2952, 2) portable as phalt plant facilities (also commonly identified by SIC code 2951), 3) facilities aggreed in manufacturing lubricating oils and greases, including those facilities classified as SIC code 2992. Not covered are: 1) petroleum refining facilities, including those that manufacture asphalt or asphalt products and that are classified as SIC code 2911 (see sector 1.), 2) oil recycling facilities (see sector N.), and 3) fats and oils rendering (see sector U.).
	E. Glass, Clay, Cement, Concrete, and Gypsum Product Manufacturing Facilities - manufacturing flat, pressed, or blown glass or glass containers; manufacturing
	hydraulic cement; manufacturing clay products including ale and brick; manufacturing of potenty and porcelain electrical supplies; manufacturing concrete products; manufacturing gypsum products; nonclay refractories; and grinding or otherwise treating minerals and earths. This section generally includes the following types of manufacturing operations: Par glass, (SIC code 3211); glass containers, (SIC code 3221); pressed and blown glass, not elsewhere classified, (SIC code 3229); hydraulic cement. (SIC code 3241); brits and structural clay tile. (SIC code 3251); ceramic wall and fiver tile. (SIC code 3253); clay refractories, (SIC code 3253); structural clay products not elsewhere classified (SIC code 3259); vitreous china table and kitchen articles (SIC code 3262); fine earthenware table and kitchen articles (SIC code 3263); corcelain electrical supplies. (SIC code 3264); pottery products, (SIC code 3269); concrete block and brick (SIC code 3271); concrete products, except block and brick (SIC code 3272); ready-mix concerts. (SIC code 3273); gypsum products, (SIC code 3275); minerals and earths, ground or otherwise treated, (SIC code 3295); and nonclay refractories. (SIC code 3297): Not covered are: time manufacturing (SIC 3274); cut stone and stone products (SIC 3281); abrasive products (SIC 3291); asbestos products (SIC 3292), mineral wool and mineral wool insulation products (SIC 3296).
:	F. Primary Metale Facilities - column anatomic state of the Company
	F. Primary Metals Facilities coking operations, statering plants, blast furnaces, smelang operations, tolling mills, easting operations, hear treating, extruding, drawing, or forging of all types of ferrous and nonferrous metals, scrap, and one. Coverage tabledes the following types of facilities: 1) Steel works, blast furnaces, and rolling
	and finishing mills including—sizel wiredrawing and sizel halls and spikes, cold-rolled steel sizes, strip, and bars; and steel pipes and tubes (SIC code 331), 2) from and steel foundness, including: gray and ducile from malleable from steel investment, and steel foundness not elsewhere classified (SIC code 332), 3) Primary smelting and refining of nonferrous metals, including—primary smelting and refining of copper, and primary production of aluminum (SIC code 333), 4) Secondary smelting and refining of nonferrous metals, (SIC code 334), 5) Rolling, drawing, and extruding of nonferrous metals, except copper and aluminum, and drawing and insulating of nonferrous with (SIC code 335), 6) Nonferrous foundries (castings), including: aluminum discassings, nonferrous die-castings, except aluminum, aluminum foundries, copper foundries, and nonferrous foundries, except copper and aluminum (SIC code 336), 7) Miscellancous primary metal products, not elsewhere classified, including: metal heat treating and primary metal products, not elsewhere classified (SIC code 339).
:	G. Metal Mines (Ore Mining and Drewing) wastive and inactive metal mining and me dressing familiers [Standard Industrial Classification (SIC) Major Group 10] if
	the sterm water has come into contact with, or is contaminated by, any overhearden, raw material, intermediate product, finished product, byproduct, or waste product located on the site of the operation. SIC Major Group 10 includes establishments primarily engaged in maining, developing mines, or exploring for metallic minerals (ores) and also includes all ore dressing and tenteficiating operations. Whether performed at mills operated in conjunction with the mines served or at mills, such as custom mills, operated separately. For the purposes of this part of the permit, the term "metal mining" includes all ore mining and/or dressing and beneficiating operations, whether performed at mills operated in conjunction with the mines served or at mills, such as custom mills, operated separately. All storm water discharges from inactive metal mining facilities and the storm water discharges from the following areas of across, and temporarily inactive, metal mining facilities are the only discharges covered by this section of the permit; topsoil piles; offsite haufvaceess roads of off active area; onsite hauf roads if not constructed of waste rock or if spent ore and mine water is not used for dust control; runoff from tulings dams/dikes when not constructed of waste rock/tulings and no process fluids are present; concentration building, if no contact with material piles; mill site, if no contact with material piles; chemical storage area; docking facility, if no excessive contact with waste product; explosive storage; reclaimed areas released from reclamation bonds. Not covered are: 1) active metal mining facilities that are subject to the effluent limitation guidelines for the Ore Mining and Dressing Point Source Point Source Category (40 CFR Part 440). Coverage under this permit does not include addit drainage or contaminated springs or seeps at across facilities, temporarily inactive facilities, or inactive facilities. Also see permit conditions, Limitations on Coverage, Part I.B.3. 2) Storm water discharges associa
١	H. Coal Mines and Coal Mine-Related Facilities - coal mining-related areas (SIC Major Group 12) if they are not subject to effluent limitations guidelines under 40
	FR Part 434. Not opvered are inactive mining activities occurring on Federal lands where an operator cannot be identified.
1	1. Oil and Gas Extraction Facilities - oil and gas facilities listed under Standard Industrial Classification (SIC) Major Group 13 which are required to be permitted
	under CAC R317-3-3 8(2)(a). These include oil and gas exploration, production, processing or treatment operations, or transmission facilities that discharge storm water tentaminated by contact with it that has come into contact with any overburden row material, intermediate products. (inished products, by-products or waste products located

in the site of such operations." Industries in SIC Major Group 13 include the extraction and production of crude oil, natural gas, oil sands and shale; the production of hydrocarbon liquids and natural gas from coal; and associated oil field service, supply and repair industries. This section also covers petroleum refineries listed under SIC code 2911. Contaminated storm water discharges from petroleum refining or drilling operations that are subject to extendily established BAT or BPT guidelines found at 40 CFR 419 and 435 respectively are not included. [Note that areas eligible for coverage at petroleum refineries will be very limited because the term "contaminated runoff," as defined under 40 CFR 419.11, includes " runoff which comes into contact with any raw material, intermediate product, by-product or waste product located on petroleum refinery property." Areas at petroleum refineries which may be eligible for permit coverage, provided discharges from these areas are not co-mingled with "contaminated runoff," include: vehicle and equipment storage, maintenance and refueling areas. Most areas at mineries will not be eligible for coverage including: raw material, intermediate product, by-product, waste material, chemical, and marerial storage areas; loading and unloading areas; masmission pipelines, and, processing areas.] Not covered are: inactive oil and gas operations occurring on Federal lands where an operator mannot be identified are not covered by this permit.
J. Mineral Mining and Processing Facilities – active and inactive mineral mining and processing facilities (generally identified by Standard Industrial Classification (SIC) Major Group 14). Not covered are: 1) facilities associated with industrial activity which are subject to an existing effluent limitation guideline (40 CFR Part 436), 2) inactive mineral mining activities occurring on Federal lands where an operator cannot be identified are not eligible for coverage under this permit.
K. Hazardous Waste Treatment Storage or Disposal Facilities – facilities that treat, store, or dispose of hazardous wastes, including those that are operating under interim status or a permit under subtitle C of RCRA. [Disposal facilities that have been properly closed and capped, and have no significant materials exposed to storm water, are considered inactive and do not require permits (UAC R317-8-3.8(6)(c)).]
L. Landfills and Land Application Sites — waste disposal at landfills, land application sites, and open dumps that receive or have received industrial wastes. Open dumps are solid waste disposal units that are not in compliance with Sate/Federal criteria established under RCRA Subditle D. Not covered are: inactive landfills, land application sites, and open dumps occurring on Federal lands where an operator cannot be identified.
M. Automobile Salvage Yards - facilities engaged in dismantling or wrecking used motor vehicles for parts recrycting or resale and for scrap (SIC Code 5015).
N. Scrap Recycling and Waste Recycling Racilities – facilities that are engaged in the processing, reclaiming and wholesale distribution of scrap and waste materials such as ferrous and nonferrous metals, paper, plastic, cardboard, glass, animal hides (these types of activities are typically identified as SIC code 5093). Facilities that are engaged in reclaiming and recycling liquid wastes such as used oil, antifreeze, mineral spirits, and industrial solvents (also identified as SIC code 5093) are also covered under this section. Separate permit requirements have been established for recycling facilities that only receive source-separated recyclible materials primarily from non-industrial and residential sources (also identified as SIC 5093) (e.g., common consumer products including paper, newspaper, glass, cardboard, plastic containers, aluminum and tin cans). This includes recycling facilities commonly referred to as material recovery facilities (MRF).
O. Steam Electric Power Generating Facilities — steam electric power generating facilities, including arms handling arms. Non-storm water discharges subject to effluent limitations guidelines are not covered by this permit. Storm water discharges from ecol pile runoff subject to numeric limitations are eligible for coverage under this permit, but are subject to the limitations established by 40 CFR 423. Not covered are: ancillary facilities such 21 fleet centers, \$\frac{1}{2}\$3 in thine stations, and substations that are not condiguous to a steam electric power generating facility are not covered by this permit. Heat expoure co-generative facilities are not covered by this permit; however, dual fuel co-generation facilities are included.
P. Vehicle Maintenance or Equipment Cleaning areas at Motor Freight Transportation Facilities, Passenger Transportation Facilities, Petroleum Bulk Oil Stations and Terminals, the United States Postal Service, or Railroad Transportation Facilities — ground transportation facilities and rail transportation facilities (generally identified by Standard Industrial Classification (SIC) codes 40, 41, 42, 43, and 5171), that have vehicle and equipment maintenance shops (vehicle and equipment rehabilitation, mechanical repairs, painting, fueling and lubrication) and/or equipment cleaning operations are eligible for coverage under this section. Also covered under this section are facilities found under SIC code 4221-4225 (public warehousing and storage) that do not have vehicle and equipment maintenance shops and/or equipment eleaning operations but have areas (exclusive of access roads and rail lines) where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products or industrial machinery are exposed to storm water.
Q. Vehicle Maintenance Areas and Equipment Cleaning Areas of Water Transportation Facilities - water transportation facilities that have vehicle (vessel)
maintenance shops and/or equipment cleaning operations. The water transportation industry includes facilities express in foreign or domestic transport of freight or passengers in deep sea or inland waters; marine cargo handling operations; ferry operations; towing and tustous services; and marines (facilities commonly identified by SIC code Major Group 44).
R. Ship or Boat Building and Repair Yards - facilities engaged in ship building and repairing and boat building and repairing (SIC code 373).
S. Vehicle Maintenance Areas, Equipment Cleaning Areas or From Airport Deicing Operations located at Air Transportation Facilities establishments and/or
facilities including airports, air terminals, air carriers, flying fields, and establishments engaged in servicing or maintaining airports and/or aircraft (generally classified under Standard Industrial Classification (SIC) code 45) which have vehicle maintenance shops, material handling facilities, equipment cleaning operations or airport and/or aircraft deicing/anti-icing operations. For the purpose of this permit, the term "deicing" is defined as the process to remove frost, snow, or ice and "anti-icing" is the process which prevents the accumulation of frost, snow, or ice. Only those portions of the facility or establishment that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, or deicing methanical repairs, painting, fueling, and lubrication), equipment cleaning operations, or deicing methanical repairs, painting, fueling, and lubrication), equipment cleaning operations, or deicing methanical repairs, painting, fueling, and lubrication), equipment cleaning operations.
T. Wastewater Treatment Works - treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the
storage, treatment, recycling, and reclamation of municipal or domestic sewage, including lands dedicated to the disposal of sewage sludge that are located within the confines of the facility with a design flow of 1.0 MGD or more, or required to have an approved pretreament program under 40 CFR Pert 403.
U. Food and Kindred Products Facilities — food and kindred products processing facilities (commonly identified by Sundard Industrial Classification (SIC) code 20), including: meat products; dairy products; canned, frozen and preserved fruits, vegetables, and food specialities; given mill product; bakery products; sugar and confectionery products; fats and oils; beverages; and miscellaneous food preparations and kindred products and tobacco products manufacturing (SIC Code 21), except for storm water discharges identified under paragraph I.B.3, where industrial plant yards; material handling sites; refuse sites; sites used for application or disposal of process wastewaters; sites
ised for storage and maintenance of material handling equipment; sites used for residential treament, storage, or disposal; shipping and receiving areas; manufacturing buildings; and storage areas for raw material and intermediate and finished products are exposed to storm water and areas where industrial activity has taken place in the past and significant materials remain. For the purposes of this paragraph, material handling activities include the storage, loading, and unloading, transportation, or conveyance of any raw material, intermediate product, finished product, by product, or waste product.

V. Textile Mills, Apparel and other Fabric Product Manufacturing Facilities - Textile Mill Products, of and regarding facilities and establishments engaged in the
preparation of fiber and subsequent manufacturing of yarn, thread, braids, twine, and cordage, the manufacturing of broad woven fabrics, narrow woven fabrics, knit fabrics, and carpets and rugs from yarn; processes involved in the dyeing and finishing of fibers, yarn fabrics, and knit apparel; the integrated manufacturing of knit apparel and other finished articles of yarn; the manufacturing of felt goods (wool), beer goods, nonwoven fabrics; miscellaneous textiles, and other appearel products (generally described by SIC codes 22 and 23). This section also covers facilities engaged in manufacturing finished leather and mificial leather products (SIC 31, except 3111).
W. Furniture and Fixture Manufacturing Facilities - facilities involved in the manufacturing of: wood kitchen cabinets (generally described by SIC code 2434);
household furniture (generally described by SIC code 251); office furniture (generally described by SIC code 252); public buildings and related furniture (generally described SIC code 253); partitions, shelving, lockers, and office and store fixtures (generally described by SIC code 254); and miscellaneous furniture and fixtures (generally described by SIC code 259).
Y Printing and Publishing For Marin
X. Printing and Publishing Facilities — newspaper, periodical, and book publishing or publishing and printing (SIC Codes 27:1-2731); book printing (SIC Code 2732) miscellaneous publishing (SIC Code 2741); commercial printing, lithographic (SIC Code 2752); commercial printing, gravure (SIC Code 2754); commercial printing, and elsewhere classified (SIC Code 2759); manifold business forms, greeting cards, bankbooks, looseleaf binders and devices, bookbinding and related work, and typeseming (SIC Codes 2761-2791); and, plate making and related services (SIC Code 2796).
Y. Rubber and Miscellaneous Plastic Product Manufacturing Facilities - rubber and miscellaneous plastic products manufacturing facilities (SIC major group 30)
and miscellaneous manufacturing industries, except jewelry, silverware, and plated ware (SIC major group 39, except 391).
Z. Leather Tanning and Finishing Facilities - leather tanning, currying and finishing (correspondy identified by Standard Industrial Classification (SIC) code 3111).
Discharges from facilities that make fertilizer solely from leather scraps and leather dust are also covered under this section.
A.A. Facilities That Manufacture Metal Products including Jewelry, Silverware and Plated Ware - fabricated metals industry listed below, except for electrical
related industries: fabricated metal products, except machinery and transportation equipment, SIC 34, and jewelry, silverware, and plaint ware (SIC Code 391).
AB. Facilities That Manufacture Transportation Equipment, Industrial or Commercial Machinery - transportation equipment, industrial or commercial
machinery manufacturing facilities (commonly described by SIC Major Group 35 except SIC 357, and SIC Major Group 37, except SIC 373). Common activities include: industrial plant yards; material handling sites; refuse sites; sites used for application or disposal of process wastewaters; sites used for storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas for raw material and intermediate and finished products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water.
AC. Facilities That Manufacture Electronic and Electrical Equipment and Components, Photographic and Optical Goods - facilities that manufacture:
electronic and other electrical equipment and components, except computer equipment (SIC major group 36); measuring, analyzing, and controlling instruments; photographic, medical and optical goods; watches and clocks (SIC major group 38) and computer and office equipment (SIC code 357).
AD. Non-Classified Facilities -facilities that meet the definition of storm water associated with industrial activity (UAC R317-8-3.8(6)(c) & (d), except for
construction activities as defined under UAC R317-8-3.8(6)(d)10.) but, can not be classified in another industrial sector (i.e., sectors A to AC), and are not excluded from permit coverage elsewhere in this permit; or, the Executive Secretary has designated as needing a storm water permit under UAC R317-8-3.8(1)(a)5. Should conditions at a facility covered by this section change and industrial activities in another section(s) contained in sectors A to AC apply, the facility shall comply with any and all applicable monitoring and pollution prevention plan requirements of the other section(s) in addition to those contained in this section. The monitoring and pollution prevention plan terms and conditions of this permit are additive for industrial activities being conducted at the same industrial facility (co-located industrial activities). The operator of the facility shall determine which monitoring and pollution prevention plan section(s) of this permit (if any) are applicable to the facility.
V. CERTIFICATION: I certify under penalty of law that this document and all anachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
Print Name:
DWAME IT WOOLUEX !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Signature: Disimpre J. Woolley Amount of Permit Fee Enclosed: S 500
WHO MUST FILE A NOTICE OF INTENT (NOI) FORM

State law at UAC R317-8-3.8 prohibits point source discharges of storm water associated with industrial activity to a water body(ies) of the State without a Utah Pollutant Discharge Elimination System (UPDES) permit. The operator of an industrial activity that has such a storm water discharge must submit a NOI to obtain coverage under the UPDES Multi-Sect Storm Water General Permit. If you have questions about whether you need a permit under the UPDES Storm Water program, contact (\$\$\frac{1}{2}\$\$1) 538-6146.

TRANS-JORDAN CITIES TRANS-JORDAN LANDFILL

10873 S. 7200 West PO Box 95610 South Jordan, Utah 84095-0610

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

Utah Division of Water Quality General Permit UTR000109 March 1, 2003

Authorization to Discharge Under the Utah Pollutant Discharge Elimination System (UPDES), General Multi-Sector Permit for Storm Water Discharges Associated with Industrial Activity

> Dwayne J. Woolley General Manager

> > March 17, 2004

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

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1.0 SWPPP INTRODUCTION

A. PURPOSE OF THE PLAN

As set forth in the "General Multi-Sector Permit" issued by the Utah Division of Water Quality, a storm water pollution prevention plan (SWPPP) "Plan" has to be developed for all facilities covered by the above permit. The "Plan" should be prepared in accordance with good engineering practices and should:

- 1. Identify potential sources of pollution which may reasonable be expected to affect the quality of storm water discharges associated with industrial activities at the facility.
- 2. Describe and implement practices used to reduce the pollutants in storm water discharges.
- 3. Assure Compliance with the terms and conditions of the "Permit".

In addition, an annual comprehensive review of the "plan" and facility shall be used to maintain ongoing compliance with the "National Pollutant Discharge Elimination system" storm water regulations.

The requirements of SARA 313 do not apply to this facility because there are no materials stored that are above reportable quantities of listed chemicals.

B. PLAN CERTIFICATION

1. Company Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision and the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonments for knowing violations."

Signature 1 Mayne J. Woolley - General Manager

Date: 3/17/04

2. Professional Engineer's Certification

"I hereby certify that I have examined Trans-Jordan Landfill's facility located at 10873 S. 7200 West, South Jordan, Utah, and being familiar with the provisions and requirements of the General Multi-Sector Permit issued by the Utah Division of Water Quality, attest that this SWPPP for Trans-Jordan's facility has been prepared in accordance with good

Signature:

Date: <u>3/18/64</u>

C. POLLUTION PREVENTION TEAM

The pollution prevention team member's names and responsibilities are listed below.

Dwayne Woolley - General Manager

- Overall responsibility for supervising the development, implementation, maintenance, coordination, and revision of the "Plan".
- Employee Training.
- Spill Reporting.
- Record keeping.
- Plan updating.

Craig Jorgensen - Operations Manager

- Leader in Spill Cleanup.
- Overall responsibility for implementation of the "Plan".
- Preventive maintenance.
- Alternate leadership and spill reporting.
- Inspections.
- Housekeeping.

Kelly Jolly - Operations Supervisor

- Reaction team member for spill cleanup.
- Alternate spill cleanup leader, inspections, housekeeping, preventative maintenance.

Arturo Acosta - Compliance Coordinator

- Record keeping.
- Inspections & Monitoring.
- Housekeeping.
- Storm Water sample collector.

D. CONSISTENCY WITH OTHER PLANS

This "Plan" is consistent with the Plan of Operations and will be consistent with and may reflect requirements of other plans as may be required such as a Spill Prevention, Control, & Countermeasures Plan (SPCC), Facility Response Plan (FRP), and Contingency/Emergency Response Plan.

2.0 DESCRIPTION OF POTENTIAL POLLUTION SOURCES

A. DRAINAGE

The landfill is located on generally sandy soil with some silt, clay, gravel and cobbles that tend to absorb the limited amount of precipitation. There is generally little run off from the side slopes of the landfill cells that would impact any surface water or storm water drainage. Bingham Creek is located to the north of the landfill and is

generally dry with the exception of major run off. Isolated erosion of soils along the side slopes of the cells does not appear to contribute to the impact of the amount of run off. Figure 1 is a site map of the landfill with features including topography contours, drainages including Bingham Creek, property boundary, well locations, and the detention pond where surface and run off water could accumulate.

The paved access road from the entrance of the landfill to the scale house and office forms a barrier that delineates the facility and the adjacent highway drainage. The ditch to the east also collects run off from the west cell slopes and directs this water to the detention basin while the western ditch directs the run off to the adjacent highway drainage.

With the construction of the "lateral expansion" in 1997 - 1998, all run off from the facility to the east of the access road is directed to the detention basin. This basin is located in the north eastern part of the property. At this point Bingham Creek is located about 100-125 feet to the north. Along the north edge of the basin a low spot on the berm is designated as the authorized discharge point for the facility. Due to the size of the basin it is unlikely that any run off within a typical storm precipitation would overflow the basin and make it to the creek. The pooled water evaporates over time.

B. EXPOSED INVENTORY OF MATERIALS

Landfill vehicles, earth moving equipment, employee parking area, deicing salt pile, and trucks hauling solid waste materials are the only exposed material in areas of possible drainages.

C. SPILLS AND LEAKS

There have been no known spills or leaks of reportable quantities in the drainage area or on the landfill property. There is no known areas where leachate has leaked from failures in the landfill.

D. SAMPLING DATA

There is no existing discharge sampling data to date as there has not been a discharge from the site. On November 21, 1991 storm water sampling was conducted on the site. Only zinc and copper were detected.

E. RISK IDENTIFICATION AND SUMMARY OF POTENTIAL POLLUTANT SOURCES

The only expected source of additional pollution aside from the landfill is from leaks or spills from vehicles, which includes earth moving equipment, and bird droppings from scavenging seagulls. The expected contaminates would be metals, oil and grease, anti-freeze (ethylene glycol), and fecal coliforms (bird droppings).

Soil used for landfill compaction and slope building is continuously transported

around on the property. The soil is typically excavated and stockpiled to cover the solid waste in sections of the landfill cells. The landfill excavation and compaction activity at times creates dust and particulate matter that covers the drainage areas. This particulate matter is from existing soils that may contain metals from past mining operations at Kennecott's copper mine. Other than the metals in the existing soils, no additional hazardous substances from the landfill operations would be added to the Bingham Creek drainage area.

The landfill is located in an historic agricultural area that may have had fertilizer, herbicide and pesticide application onto crops which have been primarily wheat.

Waste such as sewage sludge, sewage liquids, liquid wastes, and hazardous materials have been formally prohibited from disposal at the landfill since 1977. This is enforced and monitored through inspection prior and after dumping by landfill personnel. All waste hauling and loading/unloading occurs at the "face" which is within the leachate collection area and has no possibility of run off to the detention pond.

A leachate collection system has been installed as part of the construction of each cell. All new cell construction at the landfill will include a leachate collection system. There is no areas of standing water that is used for storage on the property.

A portable 3000 gallon above ground double wall diesel tank is used to fuel the larger equipment. A second above ground double wall 1000 gallon gasoline tank is used to fuel the facility support vehicles.

3.0 MEASURES AND CONTROLS

A. GOOD HOUSEKEEPING

A daily inspection of the drainage area will be preformed, any potential contaminate sources will be removed and reported, and maintenance will be performed as required.

B. PREVENTIVE MAINTENANCE

There are no devices in the storm water collection system that requires routine maintenance. The runoff ditches that direct all surface runoff to the designated detention pond located in the north eastern most corner of the property are graded as needed to ensure an open and unrestricted flow.

Salt used for deicing is placed in a natural high area and covered to prevent exposure to precipitation except during actual use of the pile.

The yearly compliance inspection will evaluate the integrity of the roads and curbs as well as any erosion in the drainages. Repairs will be preformed as needed.

Each vehicle that enters the landfill is visually inspected as it passes the inspection/scale house and is inspected before it dumps at the landfill for leaks, prohibited items and unsafe loads. Entry and or dumping will be denied for any violation.

The vehicles and equipment that are owned by the landfill are under a preventative maintenance and inspection program. Maintenance is performed on site and a log is kept for each vehicle or piece of equipment. The routine maintenance of the earth moving equipment is preformed on site while major repairs are preformed off site.

Measures to scare away the seagull such as noise guns have been installed at the property.

The leachate system is a closed system and contains all storm water that falls on the "face".

C. SPILL PREVENTION AND RESPONSE PROCEDURES

In the event of a spill, cleanup procedures will be activated and implemented by the pollution prevention team. The response will depend on the nature of the spill, the weather conditions, and toxicity of the contaminate.

Solid materials will be removed using shovels and, if the spill is large enough, a front end loader. Residuals will be swept up with a broom where feasible. The material will be loaded into the bed of a pickup truck and, unless prohibited, removed to the active landfill.

Liquid spills of materials that could affect water quality will be confined using earth berms made from locally available soils. The berms will be shoveled into place or pushed into place by available equipment. If possible, the liquids will be pumped into drums for containment. Liquids absorbed into soils will be contained in a drum. Empty drums are currently stored in the vehicle parking area and are available for containment purposes. Once the spilled material is contained it will be stored until proper disposal can be arranged.

The amount of any spill will be estimated and compared to the reportable quantities listed in 40 CFR 117.3 and 40 CFR 302.4. A copy of these lists are included as Appendix A and B. If the quantity exceeds the reportable level the pollution prevention team leader will notify the National Response Center (800-424-8802) and the Utah Division of Water Quality (801-538-6146).

The team leader will be responsible for preparation of a written description of the release, date and time, circumstances, and mitigations undertaken within 14 days of the spill.

D. MONITORING

Trans-Jordan is required to only sample any outfall discharge. There has been no

known discharge to this date. In the event of a discharge, sampling will occur and a storm water discharge monitoring report (SWDMR) will be filed per the reporting requirements.

E. REPORTING

Signed copies of any SWDMRs will be sent to the *Executive Secretary of the Water Quality Board* at the address listed below.

Department of Environmental Quality Division of Water Quality Attention Storm Water Coordinator PO Box 144870 Salt Lake City, Utah 84114-4870

F. EMPLOYEE TRAINING

All employees will be trained on landfill operations upon employment. Members of the pollution prevention team will read this pollution prevention plan, attend an annual team orientation, and sign the acknowledgment in Appendix C as an indication that they have done so. The team leader is responsible for insuring that the acknowledgment sheet is up to date. Topics addressed during both types of employee training shall include pollution control laws and regulations, the storm water pollution prevention plan and the particular features of the facility, inspections, spill response, good housekeeping, and material management practices.

G. INSPECTIONS

As required by the permit pertaining to landfills site conditions are inspected every seven days. The inspector which is a member of the pollution prevention team, inspects areas of the landfill that have not yet been finally stabilized, active land application areas, areas used for storage of materials/wastes that are exposed to precipitation, and locations where equipment and waste trucks enter and exit the site. In areas of the landfill that have been finally stabilized, inspections will be conducted once a month for erosion and sediment control measures to insure that they are operating correctly. A set of tracking or follow-up procedures is used to ensure that the appropriate actions are taken in response to the inspections. The pollution prevention plan will be revised to address any problems found during inspections. Records of the inspections will be maintained on file at the landfill office. The retention pond will be monitored during all significant rainfall episodes.

H. RECORD KEEPING AND REPORTING PROCEDURES

The Trans-Jordan Cities landfill will maintain a storm water file at the landfill office. The file contents will be:

- The Pollution Prevention Plan
- SWDMR (if any)

- Analysis (if any)
- Inventory of spill response equipment and its location

The following are maintained at the landfill office in each respective file.

- Inspections and maintenance activities
- Tracking system for types of waste disposed of in each cell of the landfill
- Tracking of quantities of waste

I. NON-STORM WATER DISCHARGES

All of the storm water system is open and drains to areas that do not have any other source of water discharge. There have been no known discharges of leachate or vehicle wash waters at the landfill property.

J. SEDIMENT AND EROSION CONTROL

Because of the granular nature of the soil, the low average rainfall (<16 inches per year) and the gentle slope of the landfill surface, erosion within the watershed and on the pavement is not likely. All areas of the landfill will be stabilized using native vegetation. As a sediment pond has been constructed to contain all run off from the site, it is anticipated no sediment will be released at the discharge point.

K. SECURITY

A six (6) foot chain link fence has been installed completely surrounding the facility and is locked during non business hours. The main access road from the highway entrance to the main structures has adequate lighting for traffic. Both the Operations and Maintenance building and the Scalehouse have outside night lighting and security systems installed which will notify the proper authorities of any unauthorized entry.

APPENDIX A

Reportable Quantities for the CWA (40 CFR 117.3)

CWA (40 CFR 117.3)

(50 5

Table 117.3 -- Reportable Quantities of Hazardous Substances Designated Pursuant to Section 311 of the Clean Water Act

Table 117.3--Reportable Quantities of Hazardous Substances Designated
Pursuant to Section 311 of the Clean Water Act

-		
		RQ in pounds
Material	Category	(kilograms)
-		
Acetaldehyde	C	1,000 (454)
Acetic acid	D	5,000 (2,270)
Acetic anhydride	D	5,000 (2,270)
Acetone cyanohydrin	A	10 (4.54)
Acetyl bromide	D	5,000 (2,270)
Acetyl blomide	D	5,000 (2,270)
Acrolein	X	1 (0.454)
Acrylonitrile	B	100 (45.4)
Adipic acid	D	5,000 (2,270)
-	X	1 (0.454)
Aldrin	B	100 (45.4)
Allyl alcohol	C	1,000 (454)
Allyl chloride	•	5,000 (2,270)
Aluminum sulfate	D	
Ammonia	В	100 (45.4)
Ammonium acetate	D	5,000 (2,270)
Ammonium benzoate	D	5,000 (2,270)
Ammonium bicarbonate	D	5,000 (2,270)
Ammonium bichromate	A	10 (4.54)
Ammonium bifluoride	B	100 (45.4)
Ammonium bisulfite	D	5,000 (2,270)
Ammonium carbamate	D	5,000 (2,270)
Ammonium carbonate	D	5,000 (2,270)
Ammonium chloride	D	5,000 (2,270)
Ammonium chromate	A	10 (4.54)
Ammonium citrate dibasic	D	5,000 (2,270)
Ammonium fluoborate	D	5,000 (2,270)
Ammonium fluoride	B	100 (45.4)
Ammonium hydroxide	C	1,000 (454)
Ammonium oxalate	D	5,000 (2,270)
Ammonium silicofluoride	C	1,000 (454)
Ammonium sulfamate	D	5,000 (2,270)
Ammonium sulfide	В	100 (45.4)
Ammonium sulfite	D	5,000 (2,270)
Ammonium tartrate	D	5,000 (2,270)
Ammonium thiocyanate	D.,	5,000 (2,270)
Amyl acetate	D	5,000 (2,270)
Aniline	D	5,000 (2,270)
Antimony pentachloride	C	1,000 (454)
Antimony potassium tartrate	В	100 (45.4)
Antimony tribromide	C	1,000 (454)
Antimony trichloride	C	1,000 (454)
Antimony trifluoride	C	1,000 (454)
Antimony trioxide	C	1,000 (454)
Arsenic disulfide	X	1 (0.454)
Arsenic distillide	X	1 (0.454)
Arsenic pentoxide	X	1 (0.454)
Arsenic trickloride	X	1 (0.454)
Arsenic trioxide	X	1 (0.454)
Alsenic crisuillae	Δ	1 (0.404)

Barium cyanide	A	10 (4.54)
Benzene	A	10 (4.54)
Benzoic acid	D	5,000 (2,270)
Benzonitrile	D	5,000 (2,270)
Benzoyl chloride	C	1,000 (454)
Benzyl chloride		
	В	100 (45.4)
Beryllium chloride	X	1 (0.454)
Beryllium fluoride	X	1 (0.454)
Beryllium nitrate	X	1 (0.454)
Butyl acetate	D	5,000 (2,270)
Butylamine	C	1,000 (454)
n-Butyl phthalate	A	10 (4.54)
Butyric acid	D	5,000 (2,270)
Cadmium acetate	A	10 (4.54)
Cadmium bromide	A	10 (4.54)
Cadmium chloride	A	10 (4.54)
Calcium arsenate	x	1 (0.454)
Calcium arsenite	X	1 (0.454)
Calcium carbide	A	10 (4.54)
Calcium chromate	A	10 (4.54)
Calcium cyanide	A	10 (4.54)
Calcium dodecylbenzenesulfonate.	C	1,000 (454)
Calcium hypochlorite	A	10 (4.54)
Captan	A	10 (4.54)
Carbaryl	В	100 (45.4)
Carbofuran	A	10 (4.54)
Carbon disulfide	В	100 (45.4)
Carbon tetrachloride	A	10 (4.54)
Chlordane	X	1 (0.454)
Chlorine	A	10 (4.54)
Chlorobenzene	В	100 (45.4)
Chloroform	A	10 (4.54)
Chlorosulfonic acid	C	1,000 (454)
Chlorpyrifos	X	1 (0.454)
Chromic acetate	C	1,000 (454)
Chromic acid	A	10 (4.54)
Chromic sulfate	C	1,000 (454)
Chromous chloride	C	1,000 (454)
Cobaltous bromide	C	1,000 (454)
Cobaltous formate	C	1,000 (454)
Cobaltous sulfamate	C	1,000 (454)
Coumaphos	A	10 (4.54)
Cresol	В	100 (45.4)
Crotonaldehyde	B	100 (45.4)
Cupric acetate	B	100 (45.4)
Cupric acetoarsenite	x	1 (0.454)
Cupric chloride	A	10 (4.54)
Cupric nitrate	В	100 (45.4)
Cupric oxalate	В	100 (45.4)
Cupric sulfate	A	10 (4.54)
Cupric sulfate, ammoniated	B	100 (45.4)
Cupric tartrate	B	100 (45.4)
Cyanogen chloride	A	10 (4.54)
Cyclohexane	C	1,000 (454)
2,4-D Acid	В	
		100 (45.4)
2,4-D Esters	B	100 (45.4)
DDT	X	1 (0.454)
Diazinon	X	1 (0.454)
Dicamba	C	1,000 (454)
Dichlobenil	В	100 (45.4)
Dichlone	X	1 (0.454)

		400 (45 4)
Dichlorobenzene	В	100 (45.4)
Dichloropropane	C	1,000 (454)
Dichloropropene	B	100 (45.4)
Dichloropropene-Dichloropropane	B	100 (45.4)
	<i>D</i>	
(mixture).	_	E 000 (2 270)
2,2-Dichloropropionic acid	D	5,000 (2,270)
Dichlorvos	A	10 (4.54)
Dicofol	A	10 (4.54)
Dieldrin	X	1 (0.454)
Diethylamine	В	100 (45.4)
Dimethylamine	C	1,000 (454)
		100 (45.4)
Dinitrobenzene (mixed)	В	
Dinitrophenol	A	10 (45.4)
Dinitrotoluene	A	10 (4.54)
Diquat	C	1,000 (454)
Disulfoton	X	1 (0.454)
Diuron	В	100 (45.4)
Dodecylbenzenesulfonic acid	C	1,000 (454)
Endosulfan	X	1 (0.454)
		1 (0.454)
Endrin	X	
Epichlorohydrin	В	100 (45.4)
Ethion	A	10 (4.54)
Ethylbenzene	C	1,000 (454)
Ethylenediamine	D	5,000 (2,270)
Ethylenediamine-tetraacetic acid	D	5,000 (2,270)
(EDTA).		
	x	1 (0.454)
Ethylene dibromide	В	100 (45.4)
Ethylene dichloride		
Ferric ammonium citrate	C	1,000 (454)
Ferric ammonium oxalate	C	1,000 (454)
Ferric chloride	C	1,000 (454)
Ferric fluoride	В	100 (45.4)
Ferric nitrate	C	1,000 (454)
Ferric sulfate	C	1,000 (454)
Ferrous ammonium sulfate	C	1,000 (454)
Ferrous chloride	B	100 (45.4)
		1,000 (454)
Ferrous sulfate	C	
Formaldehyde	В	100 (45.4)
Formic acid	D	5,000 (2,270)
Fumaric acid	D	5,000 (2,270)
Furfural	D	5,000 (2,270)
Guthion	X	1 (0.454)
Heptachlor	X	1 (0.454)
Hexachlorocyclopentadiene	A	10 (4.54)
Hydrochloric acid	D	5,000 (2,270)
	B	100 (45.4)
Hydrofluoric acid	A	100 (4.54)
Hydrogen cyanide		
Hydrogen sulfide	В	100 (45.4)
Isoprene	В	100 (45.4)
Isopropanolamine	C	1,000 (454)
dodecylbenzenesulfonate.		
Kepone	x	1 (0.454)
Lead acetate	A	10 (4.54)
Lead arsenate	X	1 (0.454)
Lead chloride	A	10 (4.54)
	A	10 (4.54)
Lead fluoborate		
Lead fluoride	A	•
Lead iodide	A	10 (4.54)
Lead nitrate	A	10 (4.54)
Lead stearate	A	10 (4.54)
Lead sulfate	A	10 (4.54)

Lead sulfide	A	10 (4.54)
Lead thiocyanate	A	10 (4.54)
Lindane	X	1 (0.454)
Lithium chromate	A	10 (4.54)
Malathion	B	100 (45.4)
Maleic acid	D	5,000 (2,270)
Maleic anhydride	D	5,000 (2,270)
Mercaptodimethur	A	10 (4.54)
Mercuric cyanide	X	1 (0.454)
Mercuric nitrate	A	10 (4.54)
Mercuric sulfate	A	10 (4.54)
Mercuric thiocyanate	A	10 (4.54)
Mercurous nitrate	A	10 (4.54)
Methoxychlor		1 (0.454)
-	X	
Methyl mercaptan	В	100 (45.4)
Methyl methacrylate	C	1,000 (454)
Methyl parathion	B	100 (45.4)
Mevinphos	A	10 (4.54)
Mexacarbate	C	1,000 (454)
Monoethylamine	В	100 (45.4)
Monomethylamine	B	100 (45.4)
Naled	A	10 (4.54)
	B	100 (45.4)
Naphthalene		· · · · · · · · · · · · · · · · · · ·
Naphthenic acid	В	100 (45.4)
Nickel ammonium sulfate	В	100 (45.4)
Nickel chloride	B	100 (45.4)
Nickel hydroxide	A	10 (4.54)
Nickel nitrate	B	100 (45.4)
Nickel sulfate	В	100 (45.4)
Nitric acid	C	1,000 (454)
Nitrobenzene	C	1,000 (454)
Nitrogen dioxide	A	10 (4.54)
Nitrophenol (mixed)	B	100 (45.4)
Nitrotoluene	C	1,000 (454)
Paraformaldehyde	C	1,000 (454)
Parathion	A	10 (4.54)
	A	10 (4.54)
Pentachlorophenol		
Phenol	C	1,000 (454)
Phosgene	A	10 (4.54)
Phosphoric acid	D	5,000 (2,270)
Phosphorus	v	
	X	1 (0.454)
Phosphorus oxychloride	C	1 (0.454) 1,000 (454)
Phosphorus oxychloride Phosphorus pentasulfide		
-	C	1,000 (454)
Phosphorus pentasulfide Phosphorus trichloride	C B	1,000 (454) 100 (45.4)
Phosphorus pentasulfide	C B C	1,000 (454) 100 (45.4) 1,000 (454)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate	C	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium arsenite	C	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 1 (0.454)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium arsenite Potassium bichromate	CBXXA	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 1 (0.454) 10 (4.54)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium arsenite Potassium bichromate Potassium chromate	CBXXXA	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 1 (0.454) 10 (4.54)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium arsenite Potassium bichromate Potassium chromate Potassium cyanide	CBXXXXAA	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium arsenite Potassium bichromate Potassium chromate Potassium cyanide Potassium hydroxide	CBXXXXAAA.	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 1,000 (454)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium bichromate Potassium chromate Potassium cyanide Potassium hydroxide Potassium permanganate	CBXXXXAAAA	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 10 (4.54) 1,000 (454)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium bichromate Potassium chromate Potassium cyanide Potassium hydroxide Potassium permanganate Propargite	CBXXXXAAA	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 1,000 (454) 1,000 (454) 100 (45.4)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium bichromate Potassium chromate Potassium cyanide Potassium permanganate Propargite Propionic acid	CBXXXXAAA	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 1,000 (454) 1,000 (45.4) 10 (4.54) 5,000 (2,270)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium bichromate Potassium chromate Potassium cyanide Potassium permanganate Propargite Propionic acid Propionic anhydride	CBCXXXAAAA	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 10 (4.54) 1,000 (454) 1,000 (45.4) 10 (4.54) 5,000 (2,270) 5,000 (2,270)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium bichromate Potassium chromate Potassium cyanide Potassium permanganate Propargite Propionic acid Propylene oxide	CBXXXAAAA	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 10 (4.54) 1,000 (454) 100 (45.4) 10 (4.54) 5,000 (2,270) 100 (45.4)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium bichromate Potassium chromate Potassium cyanide Potassium permanganate Propargite Propionic acid Propionic anhydride	CBCXXXAAAA	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 10 (4.54) 1,000 (454) 1,000 (45.4) 10 (4.54) 5,000 (2,270) 5,000 (2,270)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium bichromate Potassium chromate Potassium cyanide Potassium permanganate Propargite Propionic acid Propylene oxide	CBXXXAAAA	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 10 (4.54) 1,000 (454) 100 (45.4) 10 (4.54) 5,000 (2,270) 100 (45.4)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium bichromate Potassium chromate Potassium chromate Potassium cyanide Potassium permanganate Propargite Propionic acid Propylene oxide Pyrethrins	C	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 10 (4.54) 1,000 (454) 100 (45.4) 10 (4.54) 5,000 (2,270) 5,000 (2,270) 100 (45.4) 1 (0.454)
Phosphorus pentasulfide Phosphorus trichloride Polychlorinated biphenyls Potassium arsenate Potassium bichromate Potassium chromate Potassium chromate Potassium cyanide Potassium permanganate Propargite Propionic acid Propionic anhydride Propylene oxide Pyrethrins Quinoline	C	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 10 (4.54) 1,000 (454) 100 (45.4) 10 (4.54) 5,000 (2,270) 100 (45.4) 1 (0.454) 5,000 (2,270)
Phosphorus pentasulfide. Phosphorus trichloride. Polychlorinated biphenyls. Potassium arsenate. Potassium bichromate. Potassium chromate. Potassium chromate. Potassium cyanide. Potassium permanganate. Propargite. Propionic acid. Propionic anhydride. Propylene oxide. Pyrethrins. Quinoline. Resorcinol.	C	1,000 (454) 100 (45.4) 1,000 (454) 1 (0.454) 1 (0.454) 1 (0.454) 10 (4.54) 10 (4.54) 1,000 (454) 100 (45.4) 10 (4.54) 5,000 (2,270) 100 (45.4) 1 (0.454) 5,000 (2,270) 5,000 (2,270) 5,000 (2,270) 5,000 (2,270)

Sodium	A	10 (4.54)
Sodium arsenate	X	1 (0.454)
Sodium arsenite	x	1 (0.454)
Sodium bichromate	A	10 (4.54)
Sodium bifluoride	B	100 (45.4)
		5,000 (2,270)
Sodium bisulfite	D	•
Sodium chromate	A	10 (4.54)
Sodium cyanide	A	10 (4.54)
Sodium dodecylbenzenesulfonate	C	1,000 (454)
Sodium fluoride	C	1,000 (454)
Sodium hydrosulfide	D	5,000 (2,270)
Sodium hydroxide	C	1,000 (454)
Sodium hypochlorite	В	100 (45.4)
Sodium methylate	C	1,000 (454)
Sodium nitrite	B	100 (45.4)
Sodium phosphate, dibasic	D	5,000 (2,270)
Sodium phosphate, tribasic	D	5,000 (2,270)
Sodium selenite	B	100 (45.4)
Strontium chromate	A	10 (4.54)
Strychnine	A	10 (4.54)
Styrene	C	1,000 (454)
Sulfuric acid	C	1,000 (454)
Sulfur monochloride	C	1,000 (454)
	- · · · · ·	1,000 (454)
2,4,5~T acid	C	
2,4,5-T amines	D	5,000 (2,270)
2,4,5-T esters	C	1,000 (454)
2,4,5-T salts	C	1,000 (454)
TDE	X	1 (0.454)
2,4,5-TP acid	В	100 (45.4)
2,4,5-TP acid esters	В	100 (45.4)
Tetraethyl lead	A	10 (4.54)
Tetraethyl pyrophosphate	A	10 (4.54)
Thallium sulfate	В	100 (45.4)
Toluene	C	1,000 (454)
Toxaphene	X	1 (0.454)
Trichlorfon	В	100 (45.4)
Trichloroethylene	В	100 (45.4)
Trichlorophenol	A	10 (4.54)
Triethanolamine	C	1,000 (454)
dodecylbenzenesulfonate.		
Triethylamine	D	5,000 (2,270)
Trimethylamine	B	100 (45.4)
Uranyl acetate	B	100 (45.4)
Uranyl nitrate	B	100 (45.4)
Vanadium pentoxide	C	1,000 (454)
Vanadyl sulfate	C	1,000 (454)
Vinyl acetate	D	5,000 (2,270)
Vinylidene chloride	B	100 (45.4)
Xylene (mixed)	B	100 (45.4)
	C	1,000 (454)
Xylenol	C	1,000 (454)
Zinc acetate	= :	
Zinc ammonium chloride	C	1,000 (454) 1,000 (454)
Zinc borate	C	
Zinc bromide	C	1,000 (454)
Zinc carbonate	C	1,000 (454)
Zinc chloride	C	1,000 (454)
Zinc cyanide	A	10 (4.54)
Zinc fluoride	C	1,000 (454)
Zinc formate	C	1,000 (454)
Zinc hydrosulfite	C	1,000 (454)
Zinc nitrate	C	1,000 (454)

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[50 FR 13513, Apr. 4, 1985, as amended at 51 FR 34547, Sept. 29, 1986; 54 FR 33482, Aug. 14, 1989; 58 FR 35327, June 30, 1993; 60 FR 30937, June 12, 1995]

Note: The first number under the column headed "RQ" is the reportable quantity in pounds. The number in parentheses is the metric equivalent in kilograms. For convenience, the table contains a column headed "Category" which lists the code letters "X", "A", "B", "C", and "D" associated with reportable quantities of 1, 10, 100, 1000, and 5000 pounds, respectively.

APPENDIX B

Reportable Quantities for CERCLA (40 CFR 302.4.)

CERCLA (40 CFR 302.4)

Table 302.4.--List of Hazardous Substances and Reportable Quantities [Note: All Comments/Notes Are Located at the End of This Table]

		Statutory		Final RQ
Hazardous substance	CASRN	code[dagger]	RCRA waste No.	pounds (Kg)
Acenaphthene	83-32-9	2		100 (45.4)
Acenaphthylene	208-96 - 8	2		5000 (2270)
Acetaldehyde	75-07-0	1,3,4	U001	1000 (454)
Acetaldehyde, chloro	107-20-	4	P023	1000 (454)
Acetaldehyde, trichloro	75-87-6	4	U034	5000 (2270)
Acetamide	60-35-5	3		100 (45.4)
Acetamide, N-(aminothioxomethyl)	591-08-2	4	P002	1000 (454)
Acetamide, N-(4-ethoxyphenyl)	62-44-2	4	U187	100 (45.4)
Acetamide, N-9H-fluoren-2-yl	53-96-3	3,4	U005	1 (0.454)
Acetamide, 2-fluoro	6417-640-19-7	4	P057	100 (45.4)
Acetic acid	64-19-7	1		5000 (2270)
Acetic acid, (2,4-dichlorophenoxy)-,	94-75-7	1,3,4	U240	100 (45.4)
salts & esters.				
Acetic acid, ethyl ester	141-78-6	4	U112	5000 (2270)
Acetic acid, fluoro-, sodium salt	62-74-8	4	P058	10 (4.54)
Acetic acid, lead(2+) salt	301-04-2	1,4	U144	10 (4.54)
Acetic acid, thallium(1+) salt	563-68-8	4	U214	100 (45.4)
Acetic acid, (2,4,5-trichlorophenoxy)	93-76-5	1,4	See F027	1000 (454)
Acetic anhydride	108-24-7	1		5000 (2270)
Acetone	67-64-1	4	U002	5000 (2270)
Acetone cyanohydrin	75-86-5	1.4	P069	10 (4.54)
Acetonitrile	75-05-8	3,4		5000 (2270)
Acetophenone	98-86-2	3,4	U004	5000 (2270)
2-Acetylaminofluorene	53-96-3	3,4	บ005	1 (0.454)
Acetyl bromide	506-96-7	1		5000 (2270)
Acetyl chloride	75-36-5	1,4	U006	5000 (2270)
1-Acetyl-2-thiourea	591-08-2	4	P002	1000 (454)
Acrolein	107 -02 -8	1,2,3,4	P003	1 (0.454)
	79-06-1	3,4	U007	5000 (2270)
Acrylamide	79-10-7	3,4	U008	5000 (2270)
Acrylic acid	107-13-1	1,2,3,4	U009	100 (45.4)
Acrylonitrile	124-04-9	1,2,3,4		5000 (2270)
Adipic acid	116-06-3	4	P070	1 (0.454)
Aldicarb	309-00-2	1,2,4		1 (0.454)
Aldrin	107-18-6	1,2,4	P005	100 (45.4)
Allyl alcohol	107-18-6	1,3		1000 (454)
Allyl chloride	20859-73-8	1,3		100 (45.4)
Aluminum phosphide		1	2006	5000 (2270)
Aluminum sulfate	10043-01-3	1		1 (0.454)
4-Aminobiphenyl	92-67-1	3		1 (0.404)

5-(Aminomethyl)-3-isoxazolol	2763-96-4	4	P007	1000 (454)
4-Aminopyridine	504-24-5	4	P008	1000 (454)
Amitrole	61-82-5	4	U011	10 (4.54)
Ammonia	7664-41-7	1		100 (45.4)
Ammonium acetate	631-61-8	1		5000 (2270)
Ammonium benzoate	1863-63-4	1		5000 (2270)
Ammonium bicarbonate	1066-33-7	1		5000 (2270)
Ammonium bichromate	7789-09-5	1		10 (4.54)
Ammonium bifluoride	1341-49-7	1		100 (45.4)
Ammonium bisulfilte	10192-30-0	1		5000 (2270)
Ammonium carbamate	1111-78-0	1		5000 (2270)
Ammonium carbonate	506-87-6	1		5000 (2270)
Ammonium chloride	12125- 02- 9	1		5000 (2270)
Ammonium chromate	7788-98-9	1		10 (4.54)
Ammonium citrate, dibasic	3012-65-5	1		5000 (2270)
Ammonium fluoborate	13826-83-0	1		5000 (2270)
Ammonium fluoride	12125-01-8	1		100 (45.4)
Ammonium hydroxide	1336-21-6	1		1000 (454)
Ammonium oxalate	6009-70-7	1		5000 (2270)
	5972-73-6			
	14258-49-2			
Ammonium picrate	131-74-8	4	P009	10 (4.54)
Ammonium silicofluoride	16919-19-0	1		1000 (454)
Ammonium sulfamate	7773-06-0	1		5000 (2270)
Ammonium sulfide	12135-76-1	1		100 (45.4)
Ammonium sulfite	10196-04-0	1	, , , , , , , , , , , , , , , , , , , ,	5000 (2270)
Ammonium tartrate	14307-43-8	1		5000 (2270)
	3164-29-2			
Ammonium thiocyanate	1762-95-4	1		5000 (2270)
Ammonium vanadate	7803-55-6	4	P119	1000 (454)
[[Page 45323]]				
		_		
Amyl acetate	628-63-7	1		5000 (2270)
iso-Amyl acetate	123-92-2			
sec-Amyl acetate	626-38-0			
tert-Amyl acetate	625-16-1			
Aniline	62-53-3	1,3,4	U012	5000 (2270)
o-Anisidine	90-04-0	3		100 (45.4)
Anthracene	120-12-7	2	• • • • • • • • • • • • • • • • • • • •	5000 (2270)
Antimony[dagger][dagger]	7440-36-0	2	•••••	5000 (2270)
ANTIMONY AND COMPOUNDS	N.A.	2,3	• • • • • • • • • • • • • • • • • • • •	* *
Antimony Compounds	N.A.	2,3	• • • • • • • • • • • • • • • • • • • •	**
Antimony pentachloride	7647-18-9	1		1000 (454)
Antimony potassium tartrate	28300-74-5	1	• • • • • • • • • • • • • • • • • • • •	100 (45.4)
Antimony tribromide	7789-61-9	1		1000 (454)
An ony trichloride	10025-91-9	1	• • • • • • • • • • • • • • • • • • • •	1000 (45
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Antimony trifluoride	7783-56-4	1		1000 (454)
Antimony trioxide	1309-64-4	1		1000 (454)
<pre>Argentate(1-), bis(cyano-C)-, potassium.</pre>	506-61-6	4	P099	1 (0.454)
Aroclor 1016	12674-11-2	1,2,3		1 (0.454)
Aroclor 1221	11104-28-2	1,2,3		1 (0.454)
Aroclor 1232	11141-16-5	1,2,3		1 (0.454)
Aroclor 1242	53469-21-9	1,2,3		1 (0.454)
Aroclor 1248	12672-29-6	1,2,3		1 (0.454)
Aroclor 1254	11097-69-1	1,2,3		1 (0.454)
[dagger]Aroclor 1260	11096-82-5	1,2,3		1 (0.454)
Aroclors	1336-36-3	1,2,3		1 (0.454)
Arsenic[dagger][dagger]	7440-38-2	2,3		1 (0.454)
Arsenic acid H3AsO4	7778-39-4	4	P010	1 (0.454)
ARSENIC AND COMPOUNDS	N.A.	2,3		**
Arsenic Compounds (inorganic including arsine).	N.A.	2,3		**
Arsenic disulfide	1303-32-8	1		1 (0.454)
Arsenic oxide As203	1327-53-3	1,4	P012	1 (0.454)
Arsenic oxide As205	1303-28-2	1,4	P011	1 (0.454)
Arsenic pentoxide	1303-28-2	1,4	P011	1 (0.454)
Arsenic trichloride	7784-34-1	1		1 (0.454)
Arsenic trioxide	1327-53-3	1,4	P012	1 (0.454)
Arsenic trisulfide	1303-33-9	1		1 (0.454)
Arsine, diethyl	692-42-2	4	P038	1 (0.454)
Arsinic acid, dimethyl	75-60-5	4	U136	1 (0.454)
Arsonous dichloride, phenyl	696-28-6	4	P036	1 (0.454)
Asbestos[dagger][dagger][dagger]	1332-21-4	2,3		1 (0.454)
Auramine	492-80-8	4	U014	100 (45.4)
Azaserine	115- 02 -6	_	U015	1 (0.454)
Aziridine	151-56-4	3,4	P054	1 (0.454)
Aziridine, 2-methyl	75~55 ~ 8	3,4		1 (0.454)
Azirino[2',3':3,4]pyrrolo[1,2-a]indole- 4,7-dione, 6-amino-8-[[(50-07-7	4	U010	10 (4.54)
aminocarbonyl)oxy]methyl]-				
1,1a,2,8,8a,8b- hexahydro-8a-methoxy-				
5- methyl-,[1aS-				
(laalpha, 8beta, 8aalpha, 8balpha)]				
Barium cyanide	542-62-1	•	P013	10 (4.54)
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl	56-49-5	4	U157	10 (4.54)
Benz[c]acridine	225-51-4	4		100 (45.4)
Benzal chloride	98-87-3	4	U017	5000 (2270)
Benzamide, 3,5-dichloro-N-(1,1-dimethy1-2-58-5 propyny1)	23950-58-5	4	U192	5000 (2270)
Benz[a]anthracene	56-55-3	2,4	U018	10 (4.54)
1,2-Benzanthracene	56-55-3	·	U018	10 (4.54)
Benz[a]anthracene, 7,12-dimethyl	57-97-6	4		1 (0.454)
Delizialancinacene, //Iz armeenyz	2. 3. 3	-	•	•

Benzenamine	62-53-3	1,3,4	U012	5000 (2270)
Benzenamine, 4,4'-carbonimidoylbis	492-80-8	4	U014	100 (45.4)
(N,N dimethyl				
Benzenamine, 4-chloro	106-47-8	4	P024	1000 (454)
Benzenamine, 4-chloro-2-methyl-,	3165-93-3	4	U049	100 (45.4)
hydrochloride.				
Benzenamine, N,N-dimethyl-4-	60-11-7	3,4	U093	10 (4.54)
(phenylazo)		•		15 (1151)
Benzenamine, 2-methyl	95-53-4	3.4	U328	100 (45.4)
Benzenamine, 4-methyl	106-49-0		U353	100 (45.4)
Benzenamine, 4,4'-methylenebis [2-	101-14-4		U158	10 (4.54)
chloro		-,-	0200	10 (4.54)
Benzenamine, 2-methyl-,hydrochloride	636-21-5	Δ	U222	100 (45.4)
Benzenamine, 2-methyl-5-nitro	99-55-8		U181	100 (45.4)
Benzenamine, 4-nitro	100-01-6		P077	5000 (2270)
Benzene a	71-43-2	1,2,3,4		
Benzeneacetic acid, 4-chloro-[alpha]-	510-15-6		U038	10 (4.54)
(4-chlorophenyl) - [alpha]-hydroxy-,	310-13-0	J,4	0036	10 (4.54)
ethyl ester.				
Benzene, 1-bromo-4-phenoxy	101-55-3	2.4	11020	100 (45 4)
Benzene, 1-bromo-4-phenoxy	101-55-3	2,4	U030	100 (45.4)
[[Page 45324]]				
Benzenebutanoic acid, 4-[bis(2-	305-03-3	4	U035	10 (4.54)
chloroethyl)amino]				(
Benzene, chloro	108-90-7	1,2,3,4	U037	100 (45.4)
Benzene, (chloromethyl)	100-44-7	1,3,4		100 (45.4)
Benzenediamine, ar-methyl	95-80-7		U221	10 (4.54)
•	496-72- 0	-,-		10 (3.34)
	823-40- 5			
	25376- 45-8			
1,2-Benzenedicarboxylic acid, bis(2-	117-81-7	2,3,4	11028	100 (45.4)
ethylhexyl) ester.	11, 01,	2,3,4	0020	100 (43.4)
1,2-Benzenedicarboxylic acid, dibutyl	84-74-2	1,2,3,4	11060	10 (4.54)
ester,	04 /4 2	1,2,3,4	0003	10 (4.54)
1,2-Benzenedicarboxylic acid, diethyl	84-66-2	2.4	U088	1000 (454)
ester.	04 00 2	2,4	0000	1000 (454)
1,2-Benzenedicarboxylic acid, dimethyl	131-11-3	2 2 4	11100	5000 (2270)
ester.	131-11-3	2,3,4	0102	5000 (2270)
1,2-Benzenedicarboxylic acid, dioctyl	117-84-0	2.4	111 07	5000 (0000)
- · · · · · · · · · · - · · · · · · · ·	117-84-0	2,4	U107	5000 (2270)
ester, Benzene, 1,2-dichloro	05 50 1	1 2 4	****	
	95-50-1	1,2,4	U070	100 (45.4)
Benzene, 1,3-dichloro	541-73-1	2,4		100 (45.4)
Benzene, 1,4-dichloro	106-46-7	1,2,3,4		100 (45.4)
Benzene, 1,1'-(2,2-dichloroethylidene)	72-54-8	1,2,4	U060	1 (0.454)
bis[4-chloro	4			
Be ne, (dichloromethyl)	98-87 - 3	4	U017	5000 (227
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Benzene, 1,3-diisocyanatomethyl	91-08-7	3,4	U223	100 (45.4)
Defizence, 1,5 dilbocydnacomceniji	584-84-9	•		
	26471-62-5			
Benzene, dimethyl	1330-20-7	1,3,4	11239	100 (45.4)
	108-46-3	1,4		5000 (2270)
1,3-Benzenediol	51-43-4	4	P042	1000 (454)
amino)ethyl]				
Benzeneethanamine, alpha, alpha-	122-09-8	4	P046	5000 (2270)
dimethyl				40 (4.54)
Benzene, hexachloro	118-74-1	2,3,4	U127	10 (4.54)
Benzene, hexahydro	110-82-7	1,4		1000 (454)
Benzene, methyl	108-88-3	1,2,3,4	U220	1000 (454)
Benzene, 1-methyl-2,4-dinitro	121-14-2	1,2,3,4	U105	10 (4.54)
Benzene, 2-methyl-1,3-dinitro	606-20-2	1,2,4	U106	100 (45.4)
Benzene, (1-methylethyl)	98-82-8	3,4	U055	5000 (2270)
Benzene, nitro	98-95-3	1,2,3,4	U169	1000 (454)
Benzene, pentachloro	608-93-5	4	U183	10 (4.54)
Benzene, pentachloronitro	82-68-8	3,4	U185	100 (45.4)
Benzenesulfonic acid chloride	98-09 - 9	4	U020	100 (45.4)
Benzenesulfonyl chloride	98-09-9	4	U020	100 (45.4)
Benzene, 1, 2, 4, 5-tetrachloro	95-94-3	4	U207	5000 (2270)
Benzenethiol	108-98-5	4	P014	100 (45.4)
Benzene, 1, 1'-(2, 2, 2-	50-29-3	1,2,4	U061	1 (0.454)
trichloroethylidene) bis[4-chloro				
Benzene, 1, 1'-(2, 2, 2-	72-43-5	1,3,4	U247	1 (0.454)
trichloroethylidene) bis[4-methoxy				
Benzene, (trichloromethyl)	98-07-7	3,4	U023	10 (4.54)
Benzene, 1,3,5-trinitro	99-35-4	4	U234	10 (4.54)
Benzidine	92-87-5	2,3,4	U021	1 (0.454)
1,2-Benzisothiazol-3(2H)-one, 1,1-	81-07-2	4	U202	100 (45.4)
dioxide, & salts.	02 0, 2	_	•	
Benzo[a]anthracene	56-55 - 3	2.4	U018	10 (4.54)
1,3-Benzodioxole, 5-(1-propenyl)-1	120-58-1	·	U141	100 (45.4)
	94-59-7	4	U203	100 (45.4)
1,3-Benzodioxole, 5-(2-propeny1) 1,3-Benzodioxole, 5-propy1	94-58-6	4	U090	10 (4.54)
• • • • • • • • • • • • • • • • • • • •	22961-82-6	4	U364	~
1,3-Benzodioxol-4-ol, 2,2-dimethyl-, Benzoquinone 106-		3,4 U197	0504	10 (4.54)
Benzoquinono	98-07-7	3,4	U023	10 (4.54)
Benzotrichloride		3,4 1		1000 (454)
Benzoyl chloride	98-88-4			100 (45.4)
Benzyl chloride	100-44-7		P028	10 (4.54)
Beryllium [dagger][dagger]	7440-41-7	2,3,4	P015	IO (4.54)
[[Page 45325]]				
		2.2		**
BERYLLIUM AND COMPOUNDS	N.A.	2,3		
Beryllium chloride	7787-47-5	1		1 (0.454)
Beryllium compounds	N.A.	2,3		• •

Damellium fluorida	7787-49-7	1		1 (0 454)
Beryllium fluoride	13597-99-4	1		1 (0.454)
beryllium micrace	7787-55-5	7		1 (0.454)
D		2 2 4	D015	10 (4 54)
Beryllium powder [dagger][dagger]	7440-41-7 319-84-6	2,3,4	P015	10 (4.54)
alpha-BHC		2		10 (4.54)
beta-BHC	319-85-7	2		1 (0.454)
delta-BHC	319-86-8	2		1 (0.454)
gamma-BHC	58-89-9	1,2,3,4		1 (0.454)
2,2'-Bioxirane	1464-53-5	4	U085	10 (4.54)
Biphenyl	92-52-4	3		100 (45.4)
[1,1'-Biphenyl]-4,4'-diamine	92-87-5	2,3,4	U021	1 (0.454)
[1,1'-Biphenyl]-4,4'-diamine,3,3'-	91-94-1	2,3,4	U073	1 (0.454)
dichloro				
[1,1'-Biphenyl]-4,4'-diamine,3,3'-	119-90-4	3,4	U091	100 (45.4)
dimethoxy				
[1,1'-Biphenyl]-4,4'-diamine,3,3'-	119-93-7	3,4	U095	10 (4.54)
dimethyl				
Bis(2-chloroethoxy) methane	111-91-1	2,4	U024	1000 (454)
Bis(2-chloroethyl) ether	111-44-4	2,3,4	U025	10 (4.54)
Bis(chloromethyl) ether	542-88-1	2,3,4		10 (4.54)
Bis(2-ethylhexyl) phthalate	117-81-7	3,4	U028	100 (45.4)
Bromoacetone	598-31-2	4	P017	1000 (454)
Bromoform	75-25-2	2,3,4	U225	100 (45.4)
Bromomethane	74-83-9	2,3,4	U029	1000 (454)
4-Bromophenyl phenyl ether	101-55-3	2,4		100 (45.4)
Brucine	357-57 - 3	4	P018	100 (45.4)
1,3-Butadiene	106-99-0	3	1010	10 (4.54)
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87-68-3	2,3,4	TT1 2 Q	1 (0.454)
1-Butanamine, N-butyl-N-nitroso	924-16-3	2,3,4		·
1-Butanol	71-36-3	4	U031	10 (4.54)
2-Butanone	78-93-3			5000 (2270)
		3,4		5000 (2270)
2-Butanone, 3,3-dimethyl-1(methylthio)-	39196-18-4	4	P045	100 (45.4)
, O-[(methylamino)carbonyl] oxime.	4330 00 4			
2-Butanone peroxide	1338-23-4	4		10 (4.54)
2-Butenal	123-73-9	1,4	U053	100 (45.4)
	4170-30-3			
2-Butene, 1,4-dichloro	764-41-0		U074	1 (0.454)
2-Butenoic acid, 2-methyl-, 7-[[2,3-	303-34-4	4	U143	10 (4.54)
dihydroxy-2-(1-methoxyethyl)-3-				
methyl-1-oxobutoxy $methyl$]-2,3, 5,7a-				
tetrahydro- 1H-pyrrolizin-1-yl ester,				
[1S-[1alpha(Z), 7(2S*,3R*),7aalpha]]				
Butyl acetate	123-86-4	1		5000 (2270)
iso-Butyl acetate	110-19-0			
sec-Butyl acetate	105-46-4			
tert-Butyl acetate	540-88-5			
n-Butyl alcohol	71-36-3	4	U031	5000 (2270)
Bu amine	109-73-9	1		1000 (45
		_		2000 (34

(1		· ·	
iso-Butylamine	78-81-9			
sec-Butylamine	513-49-5			
Sec-Bucytamine	13952-84-6			
tert-Butylamine	75-64-9			
Butyl benzyl phthalate	85-68-7	2		100 (45.4)
n-Butyl phthalate	84-74-2	1,2,3,4	U069	10 (4.54)
Butyric acid	107-92-6	1		5000 (2270)
iso-Butyric acid	79-31-2	_		• •
Cacodylic acid	75-60-5	4	U136	1 (0.454)
Cadmium [dagger][dagger]	7440-43-9	2		10 (4.54)
Cadmium acetate	543-90-8	1		10 (4.54)
CADMIUM AND COMPOUNDS	N.A.	2,3		**
Cadmium bromide	7789-42-6	1		10 (4.54)
Cadmium chloride	10108-64-2	1		10 (4.54)
Cadmium compounds	N.A.	2,3		**
Calcium arsenate	7778-44-1	1		1 (0.454)
Calcium arsenite	52740-16-6	1		1 (0.454)
Calcium carbide	75~20-7	1		10 (4.54)
Calcium carbide	13765-19-0	1,4	U032	10 (4.54)
	156-62-7	3	0032	1000 (454)
Calcium cyanamide	592-01-8	1.4	P021	10 (4.54)
Calcium cyanide Ca(CN)2	26264-06-2	1,4	1021	1000 (454)
Calcium dodecylbenzenesulfonate Calcium hypochlorite	7778~54-3	1		10 (4.54)
Captan	133~06-2	1,3		10 (4.54)
Captan	133 00 2	1,3		_ (, , , , , , , , , , , , , , , , , ,
[[Page 45326]]				
Carbamic acid, 1H-benzimidazol-2-yl,	10605-21-7		U372	1 (0 151)
b	72-55-9	2		1 (0.454)
[[Page 45328]]				
DDE b	3547-04 - 4	3		5000 (2270)
4, 4'-DDE	72-55-9			1 (0.454)
DDT	50-29-3		U061	1 (0.454)
4, 4'-DDT	50-29-3	1,2,4		1 (0.454)
DDT AND METABOLITES	N.A.	2		**
DEHP	117-81-7		U028	100 (45.4)
Diallate	2303-16-4	4	U062	100 (45.4)
Diazinon	333-41-5	1		1 (0.454)
Diazomethane	334-88-3	3		100 (45.4)
Dibenz[a,h]anthracene	53-70-3	2,4	U063	1 (0.454)
1,2:5,6-Dibenzanthracene	53-70-3	2,4	U063	1 (0.454)
Dibenzo[a,h]anthracene	53-70-3	2,4	U063	1 (0.454)
Dibenzofuran	132-64-9	3		100 (45.4)
Dibenzo[a,i]pyrene	189-55-9	4	U064	10 (4.54)
DINGUSO[d, I] PATERE	107 33 7	-	~ · · ·	(/

1,2-Dibromo-3-chloropropane	96-12-8	3,4	U066	1 (0.454)
Dibromoethane	106-93-4	1,3,4	U067	1 (0.454)
Dibutyl phthalate	84-74-2	1,2,3,4	U069	10 (4.54)
Di-n-butyl phthalate	84-74-2	1,2,3,4	U069	10 (4.54)
Dicamba	1918-00-9	1,2,3,4		1000 (454)
Dichlobenil	1194-1-65-6	1		1000 (45.4)
Dichlone	117-80-6	1		1 (0.454)
Dichlorobenzene	25321-22-6	1		100 (45.4)
1,2-Dichlorobenzene	95-50-1	1,2,4		100 (45.4)
1,3-Dichlorobenzene	541-73-1	2,4	U071	100 (45.4)
1,4-Dichlorobenzene	106-46-7	1,2,3,4	U072	100 (45.4)
m-Dichlorobenzene	541-73-1	2,4	U071	100 (45.4)
o-Dichlorobenzene	95-50-1	1,2,4	U070	100 (45.4)
p-Dichlorobenzene	106-46-7	1,2,3,4	U072	100 (45.4)
DICHLOROBENZIDINE	N.A.	1,2,3,4		100 (45.4)
3,3'-Dichlorobenzidine	91-94-1	2,3,4	U073	1 (0.454)
Dichlorobromomethane	75-27-4	2,3,4		5000 (2270)
1,4-Dichloro-2-butene	764-41-0	4	U074	
Dichlorodifluoromethane	75-71-8	4	U075	1 (0.454) 5000 (2270)
1,1-Dichloroethane	75-34-3	2,3,4	U076	1000 (2270)
1,2-Dichloroethane	107-06-2	1,2,3,4	U077	
1,1-Dichloroethylene	75-35-4	1,2,3,4	U078	100 (45.4)
1,2-Dichloroethylene	156-60-5	2,4	U079	100 (45.4)
Dichloroethyl ether	111-44-4	2,4	U025	1000 (454)
Dichloroisopropyl ether	108-60-1	2,3,4	U027	10 (4.54)
Dichloromethane	75-09-2	2,4	U080	1000 (454)
Dichloromethoxyethane	111-91-1			1000 (454)
Dichloromethyl ether	542-88 - 1	2,4	P016	1000 (454)
2,4-Dichlorophenol	120-83-2	2,3,4 2,4	U081	10 (4.54)
2,6-Dichlorophenol	87-65-0	2,4	U082	100 (45.4)
Dichlorophenylarsine	696-28-6	4	P036	100 (45.4)
Dichloropropane	26638-19-7	1		1 (0.454)
1,1-Dichloropropane	78-99 - 9	1	• • • • • • • • • • • • • • • • • • • •	1000 (454)
	142-28-9			
1,3-Dichloropropane	78-87-5	1 2 2 4	****	1000 (454)
DichloropropaneDichloropropene	8003-19-8	1,2,3,4		1000 (454)
(mixture).	8003-19-8	1	•••••	100 (45.4)
Dichloropropene	26952-23-8	1		100 (45 4)
_ _		1	••••••	100 (45.4)
2,3-Dichloropropene	78-88-6	1 2 2 4	77004	100 (45 4)
1,3-Dichloropropene	542-75-6 75-99-0	1,2,3,4		100 (45.4)
Dichlorvos			•••••	5000 (2270)
	62-73-7	1,3	• • • • • • • • • • • • • • • • • • • •	10 (4.54)
Dicofol	115-32-2	1 0 4		10 (4.54)
Dieldrin	60-57-1	1,2,4	P037	1 (0.454)
1,2:3,4-Diepoxybutane	1464-53-5	4	U085	10 (4.54)
Diethanolamine	111-42-2	3	• • • • • • • • • • • • • • • • • • • •	100 (45.4)
Diethylamine	109-89-7	1	• • • • • • • • • • • • • • • • • • • •	100 (45.4)
N, iethylaniline	91-66-7	3	• • • • • • • • • • • • • • • • • • • •	1000 (45
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/	Ĺ			CIBOLX (MCIR)
Diethylarsine	692-42-2 123-91-1 117-81-7 1615-80-1 3288-58-2	3,4 2,3,4 4	U086 U087	1 (0.454) 100 (45.4) 100 (45.4) 10 (4.54) 5000 (2270)
Diethyl-p-nitrophenyl phosphate Diethyl phthalate	311-45-5 84-66-2	4 2,4	P041 U088	100 (45.4) 1000 (454)
[[Page 45329]]		, -		
O,O-Diethyl O-pyrazinyl phosphorothioate.	297-97-2	4	P040	100 (45.4)
Diethylstilbestrol	56-53-1	4	U089	1 (0.454)
Diethyl sulfate	64-67-5	3		. 10 (4.54)
Dihydrosafrole	94-58-6	4	U090	10 (4.54)
Diisopropylfluorophosphate (DFP)	55-91-4	_		100 (45.4)
1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro- 1,4,4a,5,8,8a-hexahydro-, (lalpha,4alpha,4abeta,5alpha, 8alpha,8abeta)	309-00-2	1,2,4	P004	1 (0.454)
1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro- 1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta, 5beta,8beta,8abeta)	465-73-6	4	P060	1 (0.454)
2,7:3,6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9-hexachloro-la,2,2a,3,6,6a,7,7a-octahydro-,(laalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta,7aalpha)	60-57-1	1,2,4	P037	1 (0.454)
2,7:3,6-Dimethanonaphth[2, 3-b]oxirene,3,4,5,6,9,9-hexachloro-la,2,2a,3,6,6a,7,7a-octahydro-,(laalpha,2beta,2abeta,3alpha,6alpha,6abeta,7beta,7aalpha)-, & metabolites.	72-20-8	1,2,4	P051	1 (0.454)
Dimethoate	60-51-5	4	P044	10 (4.54)
3,3'-Dimethoxybenzidine	119-90-4	3,4	U091	100 (45.4)
Dimethylamine	124-40-3	1,4		1000 (454)
Dimethyl aminoazobenzene	60-11-7	3,4	U093	10 (4.54)
p-Dimethylaminoazobenzene	60-11-7	3,4		10 (4.54)
N, N-Dimethylaniline	121-69-7	3		,
7,12-Dimethylbenz[a]anthracene	57-97-6	4	U094	1 (0.454)
3,3'-Dimethylbenzidine	119-93-7	3,4	U095	10 (4.54)
alpha,alpha-	80-15-9	4	U096	10 (4.54)

Dimethylbenzylhydroperoxide.				
Dimethylcarbamoyl chloride	79-44-7	3,4	U097	1 (0.454)
Dimethylformamide	68-12-2	3		100 (45.4)
1,1-Dimethylhydrazine	57-14-7	3.4	U098	10 (4.54)
1,2-Dimethylhydrazine	540-73-8	4		1 (0.454)
alpha, alpha-Dimethylphenethylamine	122-09-8	_	P046	5000 (2270)
2,4-Dimethylphenol	105-67-9	2,4		100 (45.4)
Dimethyl phthalate	131-11-3	2,3,4		5000 (2270)
Dimethyl sulfate	77-78-1	3,4		100 (45.4)
Dinitrobenzene (mixed)	25154-54-5	1		100 (45.4)
m-Dinitrobenzene	99-65-0	_		100 (1014)
o-Dinitrobenzene	528-29-0			
p-Dinitrobenzene	100-25-4			
4,6-Dinitro-o-cresol, and salts	534-52-1	2,3,4	P047	10 (4.54)
Dinitrophenol	25550-58-7	1		10 (4.54)
2,5-Dinitrophenol	329-71-5	_		10 (4.54)
2,6-Dinitrophenol	573-56-8			
2,4-Dinitrophenol	51-28-5	1,2,3,4	P048	10 (4.54)
Dinitrotoluene	25321-14-6	1,2		10 (4.54)
3,4-Dinitrotoluene	610-39-9	1,2	• • • • • • • • • • • • • • • • • • • •	10 (4.54)
2,4-Dinitrotoluene	121-14-2	1,2,3,4	11105	10 (4.54)
2,6-Dinitrotoluene	606-20-2	1,2,4		100 (45.4)
Dinoseb	88-85-7	4		1000 (45.4)
Di-n-octyl phthalate	117-84-0	_	U107	5000 (2270)
1,4-Dioxane	123-91-1	3,4		100 (45.4)
DIPHENYLHYDRAZINE	N.A.	2		**
1,2-Diphenylhydrazine	122-66-7	2,3,4		10 (4.54)
Diphosphoramide, octamethyl	152-16-9	2,3,4		100 (45.4)
Diphosphoric acid, tetraethyl ester	107-49-3	-	P111	10 (4.54)
Dipropylamine	142-84-7	· ·	U110	5000 (2270)
Di-n-propylnitrosamine	621-64-7	2,4	U111	10 (4.54)
Diquat	85-00-7	1		100 (4.54)
Diquaciiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	2764-72-9	1	•••••	1000 (454)
Disulfoton	298-04-4	1 /	P039	1 (0.454)
Dithiobiuret	541-53-7	•	P049	100 (45.4)
1,3-Dithiolane-2- carboxaldehyde, 2,4-	26419-73-8		P185	100 (43.4)
c				
Fluoranthene	206-44-0		U120	100 (45.4)
Fluorene	86-73-7	2,4		5000 (2270)
Fluorine	7782-41-4		P056	10 (4.54)
Fluoroacetamide	640-19-7	4		
Fluoroacetic acid, sodium salt	62-74-8	-		100 (45.4)
Formaldehyde	50-00-0		P058	10 (4.54)
Formic acid	64-18-6	1,3,4		100 (45.4)
Fulminic acid, mercury(2+)salt	628-86-4	1,4	U123 P065	5000 (2270)
Fumaric acid	110-17-8	1		10 (4.54)
Furan	110-17-8	4	TT1 2 A	5000 (2270)
2- incarboxaldehyde	98-01-1	-	U124	100 (45.4)
2 mearbonardenyde	30-01-1	1,4	U125	5000 (227(
				•

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2.5-Furandione	108-31-6	1,3,4	U147	5000 (2270)
Furan, tetrahydro	109-99-9	4	U213	1000 (454)
Furfural	98-01-1	1,4	U125	5000 (2270)
Furfuran	110-00-9	4	U124	100 (45.4)
Glucopyranose, 2-deoxy-2-(3-methyl-3-	18883-66-4	4	U206	1 (0.454)
nitrosoureido)-,D				
D-Glucose, 2-deoxy-2-	18883-66-4	4	U206	1 (0.454)
[[(methylnitrosoamino)-				
carbonyl]amino]				
Glycidylaldehyde	765-34-4	4	U126	10 (4.54)
Glycol ethers d	N.A.	3		* *
Guanidine, N-methyl-N'-nitro-N-nitroso-	70-25-7	4	U163	10 (4.54)
Guarrante, w meengr w mroto w meengr				
Guthion	86-50-0	1		1 (0.454)
HALOETHERS	N.A.	2		**
HALOMETHANES	N.A.	2		**
Heptachlor	76-44-8	1,2,3,4	P059	1 (0.454)
HEPTACHLOR AND METABOLITES	N.A.	2		**
Heptachlor epoxide	1024-57-3	2		1 (0.454)
Hexachlorobenzene	118-74-1	2,3,4	U127	10 (4.54)
Hexachlorobutadiene	87-68-3	2,3,4	U128	1 (0.454)
HEXACHLOROCYCLOHEXANE (all isomers)	608-73-1	2		**
Hexachlorocyclopentadiene	77-47-4	1,2,3,4	U130	10 (4.54)
Hexachloroethane	67-72-1	2,3,4	U131	100 (45.4)
Hexachlorophene	70-30-4	4	U132	100 (45.4)
Hexachloropropene	1888-71-7	4	U243	1000 (454)
Hexaethyl tetraphosphate	757-58-4	4	P062	100 (45.4)
Hexamethylene-1,6-diisocyanate	822-06-0	3		100 (45.4)
Hexamethylphosphoramide	680-31-9	3		1 (0.454)
Hexane	110-54-3	3		5000 (2270)
Hexone	108-10-1	3,4	U161	5000 (2270)
Hydrazine	302-01-2	3,4	U133	1 (0.454)
Hydrazinecarbothioamide	79-19-6	4	P116	100 (45.4)
Hydrazine, 1,2-diethyl	1615-80-1	4	U086	10 (4.54)
Hydrazine, 1,1-dimethyl	57-14-7	3,4	U098	10 (4.54)
Hydrazine, 1,2-dimethyl	540-73-8	4	U099	1 (0.454)
Hydrazine, 1,2-diphenyl	122-66-7	2,3,4	U109	10 (4.54)
Hydrazine, methyl	60-34-4	3,4	P068	10 (4.54)
Hydrochloric acid	7647-01-0	1,3		5000 (2270)
Hydrocyanic acid	74-90-8	1,4	P063	10 (4.54)
Hydrofluoric acid	7664-39-3	1,3,4	U134	100 (45.4)
Hydrogen chloride	7647-01-0	1,3		5000 (2270)
Hydrogen cyanide	74-90-8	1,4	P063	10 (4.54)
Hydrogen fluoride	7664-39-3	1,3,4		100 (45.4)
Hydrogen phosphide	7803-51-2	3,4	P096	100 (45.4)
Hydrogen sulfide H2S	7783-06-4	1,4	U135	100 (45.4)
Hydroperoxide, 1-methyl-1-phenylethyl-	80-15-9	4	U096	10 (4.54)
Hydroquinone	123-31-9	3		100 (45.4)

Isophorone 78-59-1 2,3 5000 (227) Isoprene 78-79-5 1 100 (45.6) [[Page 45332]]
Isopropanolamine 42504-46-1 1
Isosafrole
3(2H)-Isoxazolone, 5-(aminomethyl) 2763-96-4 4 P007 1000 (45.4)
Kepone
Lasiocarpine
Lead[Dagger][Dagger]
Lead acetate
LEAD AND COMPOUNDS
Lead arsenate
7645-25-2
10102-48-4
Lead, bis(acetato-0)tetrahydroxytri 1335-32-6 4 U146 10 (4.54
Lead chloride
Lead compounds
Lead fluoborate
Lead fluoride
Lead iodide
Lead nitrate
Lead phosphate
Lead stearate
7428-48-0
52652-59 - 2
56189-09-4
Lead subacetate
Lead sulfate
15739-80-7
Lead sulfide
Lead thiocyanate 592-87-0 1 10 (4.56
Lindane 58-89-9 1,2,3,4 U129 1 (0.45
Lindane (all isomers)
Lithium chromate
Malathion
Maleic acid 110-16-7 1 5000 (2270
Maleic anhydride
Ma > hydrazide 123-33-1 4 U148 5000 (227

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Malononitrile	109-77-3		4	U149	1000 (454)
Manganese,	15339-36-3			P196	е
N.A. 3		**			
POLYNUCLEAR AROMATIC HYDROCARBONS	N.A.		2		**
Potassium arsenate	7784-41-0		1		1 (0.454)
Potassium arsenite	10124-50-2		1		1 (0.454)
Potassium bichromate	7778-50-9		1		10 (4.54)
Potassium chromate	7789-00-6		1		10 (4.54)
Potassium cyanide K(CN)	151-50-8	1,	, 4	P098	10 (4.54)
Potassium hydroxide	1310-58-3		1		1000 (454)
Potassium permanganate	7722-64-7				100 (45.4)
Potassium silver cyanide	506-61-6		4	P099	1 (0.454)
Pronamide	23950-58-5		4	U192	5000 (2270)
[[Page 45336]]					
	1646-88-4		4	P203	
f		4 K	169		10 (4.54)
Crude oil storage tank sediment from					
petroleum refining operations.					
K170 ^f			4	K170	1 (0.454)
Clarified slurry oil tank sediment and/					
or in-line filter/separation solids					
from petroleum refining operations.					
K171 ^f			4	K171	1 (0.454)
Spent hydrotreating catalyst from					
petroleum refining operations. (This					
listing does not include inert					
support media.)					
K172 ^f			4	K172	1 (0.454)
Spent hydrorefining catalyst from					
petroleum refining operations. (This					
listing does not include inert					
support media.)					
K174 ^f				K174	1 (0.454)
K175 ^f			4	K175	1 (0.454)
K176	• • • • • • • • • • • • • • • • • • • •				
Baghouse filters from the production			4	K176	1 (0.454)
of antimony oxide, including filters					
from the production of intermediates					
(e.g., antimony metal or crude					
antimony oxide)					
K177					
Slag from the production of antimony			4	K177	5,000 (2270)
oxide that is speculatively					
accumulated or disposed, including					
slag from the production of					

[dagger] Indicates the statutory source defined by 1,2,3, and 4, as described in the note preceding Table 302.4. [dagger][dagger] No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers (0.004 inches).

[dagger][dagger][dagger] The RQ for asbestos is limited to friable forms only.

The Agency may adjust the statutory RQ for this hazardous substance in a future rulemaking; until then the statutory one-pound RQ applies.

Sec. The adjusted RQs for radionuclides may be found in Appendix B to this table.

** Indicates that no RQ is being assigned to the generic or broad class.

- ^a Benzene was already a CERCLA hazardous substance prior to the CAA Amendments of 1990 and received an adjusted 10-pound RQ based on potential carcinogenicity in an August 14, 1989, final rule (54 FR 33418). The CAA Amendments specify that ``benzene (including benzene from gasoline)'' is a hazardous air pollutant and, thus, a CERCLA hazardous substance.
- The CAA Amendments of 1990 list DDE (3547-04-4) as a CAA hazardous air pollutant. The CAS number, 3547-04-4, is for the chemical, p,p'dichlorodiphenylethane. DDE or p,p'-dichlorodiphenyldichloroethylene, CAS number 72-55-9, is already listed in Table 302.4 with a final RQ of 1 pound. The substance identified by the CAS number 3547-04-4 has been evaluated and listed as DDE to be consistent with the CAA section 112 listing, as amended. Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.
- Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR where:

n = 1, 2, or 3;

R = alkyl C7 or less; or

R = phenyl or alkyl substituted phenyl;

R' = H or alkyl C7 or less; or

OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.

e Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100 deg.C.

f See 40 CFR 302.6(b)(1) for application of the mixture rule to this hazardous waste.

APPENDIX C

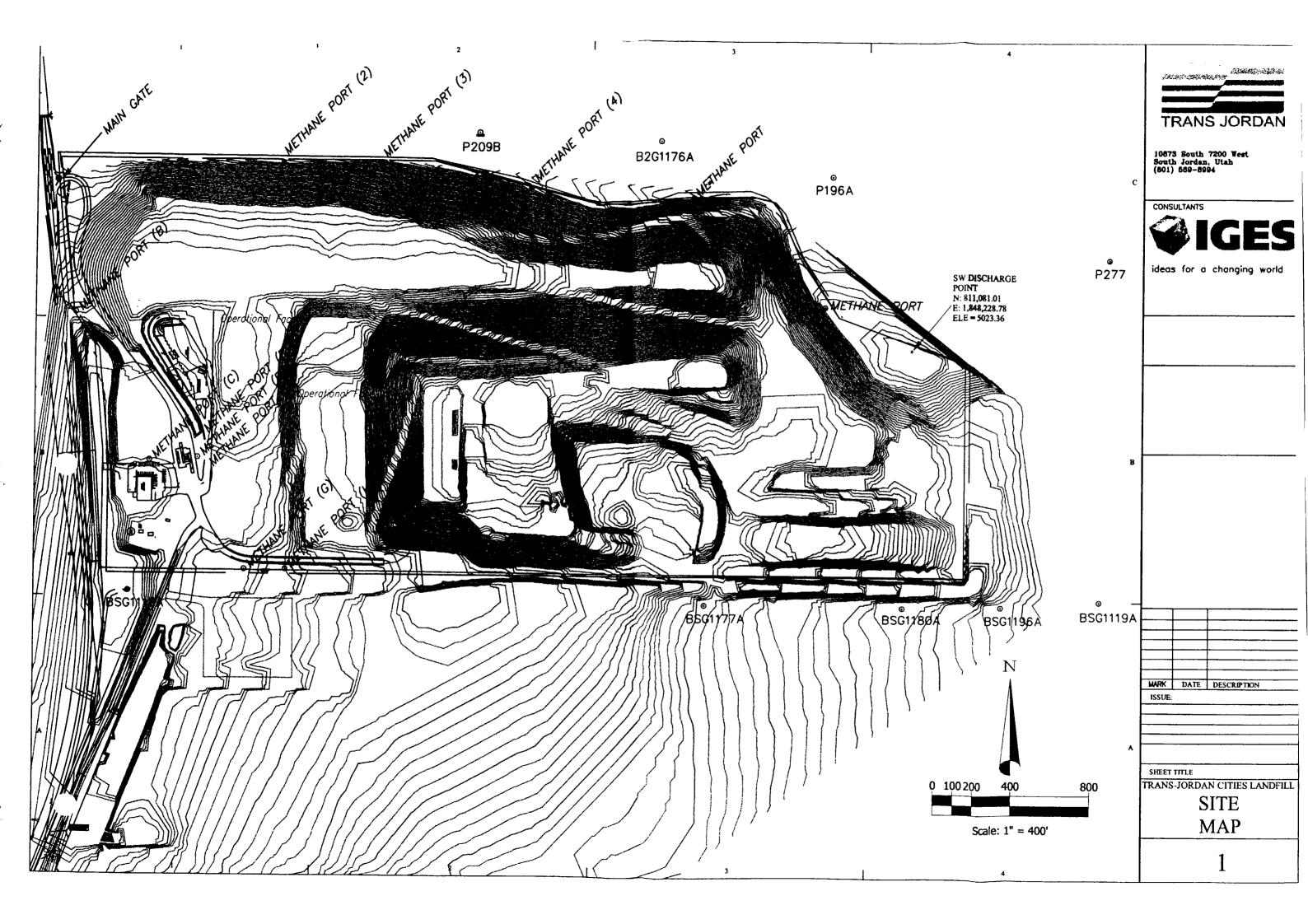
Acknowledgment Sheet

SWPP Acknowledgment Agreement

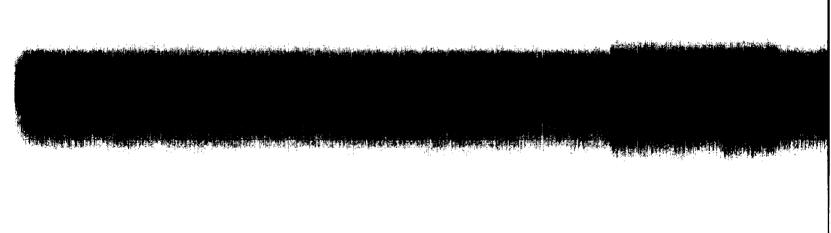
I have read and understand the Tran-Jordan Landfill's Storm Water Pollution Prevention Plan (SWPP). I acknowledge and agree that I am responsible for knowing the information contained in the SWPP in case of an incident associated to the specifications in the plan.

I understand that by signing this document it certifies that I have examined the SWPP and have been prepared in case of an incident.

Print Name and Title	
Employee's Signature	Date



APPENDIX E – LANDFILL FORMS





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METHANE OBSERVATION FORM

Date	Inspector	Location	Reading	Comments
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DAILY INSPECTION FORM

SITE SECURITY		
Item	Item Operational	Comments / Action (if not operational)
Fences	Yes / No	
Gates	Yes / No	
Lights	Yes / No	
Security System	Yes / No	
SITE CONTROLS		
Item	Item Operational	Comments / Action (if not operational)
Signs	Yes / No	
Access Roads	Yes / No	
Run-on Controls	Yes / No	
Run-off Controls	Yes / No	
Litter Fences	Yes / No	
Bird Control Devices	Yes / No	
Leachate Compliance	Yes / No	
MISCELLANEOUS		
Item	Item Operational	Comments / Action (if not operational)
Excessive Wind Blown Litter	Yes / No	
Vectors	Yes / No	
Fires	Yes / No	
Fuel Tank Leaks	Yes / No	
Radio Communications	Yes / No	
Vehicle Keys	Yes / No	
Equipment Keys	Yes / No	
HHW Sump Pump	Yes / No	
OTHER (Describe):		
	101	
Inspector:		Date:



MONTHLY INSPECTION FORM MONTH____

Maintenance Building						
Item	Location	#	Functional	Comments (If item not functional - give location)		
Elevator			Yes / No			
Elevator Phone	Elevator		Yes / No			
GFCI Outlets	Bathrooms	2	Yes / No			
	Outside	4	Yes / No			
	Garage	6	Yes / No			
	Elevator	1	Yes / No			
Central Air Filters	Roof	2	Yes / No			
_ :	Note: Replace Quar	terly		Last Date Replaced:		
Signs	Information	1				
	Handicapped	1				
	Water Warning (south of building)	2				
Fire Extinguishers	Bldg / Elev Room	1	Yes / No			
Used Oil Tank Alarm in Shop			Yes / No			
Safety Devices	Garage Doors	4	Yes / No			
SCALEHOUSE						
Item	Location	#	Functional	Comments (If item not functional / damaged- give location and problem)		
GFCI Outlets	Bathroom	1				
,	Outside	3				
Central Air Filters	Roof	1	Yes / No			
	Note: Replace Quar	terly		Last Date Replaced:		
Signs	Outside Bldg.	12				
Fire Extinguishers	Inside Bldg	2				
PUBLIC CONVE	NIENCE CENTER (PCC	C)			
Item	Location	#	Functional	Comments (If item not functional / damaged- give location and problem)		
GFCI Outlets	ннш	2	Yes / No			
	Middle Wall	5	Yes / No			
Signs	Informational	6	Yes / No			
	Warning	9	Yes / No			
Eyewash Station	HHW Shed	1	Yes / No			
Heater		1	Yes / No			
Fire Extinguisher	Outside	2	Yes / No			

LANDFILL ROAL	D & WARNING SI	GNS				
Item	Location	#	Functional	Comments (If item not functional / damaged- give location and problem)		
SVWRF Access	Water Monitoring	5	Yes / No			
Road	Information	5	Yes / No			
	Stop	1	Yes / No			
From entrance to gravel road	Informational / Warning	19	Yes / No			
Road to new & old cell dumping face (gravel)	Informational / Warning	1	Yes / No			
WATER MONITO	ORING WELLS	.				
Well #	Location		Functional	Comments (If item not functional / damaged- give location and problem)		
Well 1	Northwest		Yes / No			
Well 2	Northeast		Yes / No			
Well 3	Southeast		Yes / No			
Well 4	West of Cell #6		Yes / No			
Well 5	West of O&M		Yes / No			
MISCELLANEOU	JS					
Item	Located	#	Functional	Comments (If item not functional / damaged- give location and problem)		
Methane Flare Stati	on		Yes / No	Not applicable		
Condensate Pumps	-		Yes / No	Not applicable		
Gas Collection Valv	ves		Yes / No	Not applicable		
Fire Extinguishers	Various		Yes / No	Inspection Date by Simplex / Grunell:		
Fire Suppression	Equipment		Yes / No	Inspection Date by Simplex / Grunell:		
First Aid Supplies	Lunchroom & Vehicles		Yes / No	Inspection Date by Xpect:		
MSDS Books	Lunchroom / Shop	2	Yes / No			
Fire Pump Bldg			Yes / No			
Water Test	Comple	eted:	Yes / No	Last test date: (to be done monthly)		
Water Tank Level	Need refil	ling:	Yes / No			
Methane Well Monitoring	Completed:		Yes / No	Last test date: (to be done qtrly)		
Radio Frequency Alarm on IT	Comple	eted:	Yes / No			

Inspector(s):	Date:

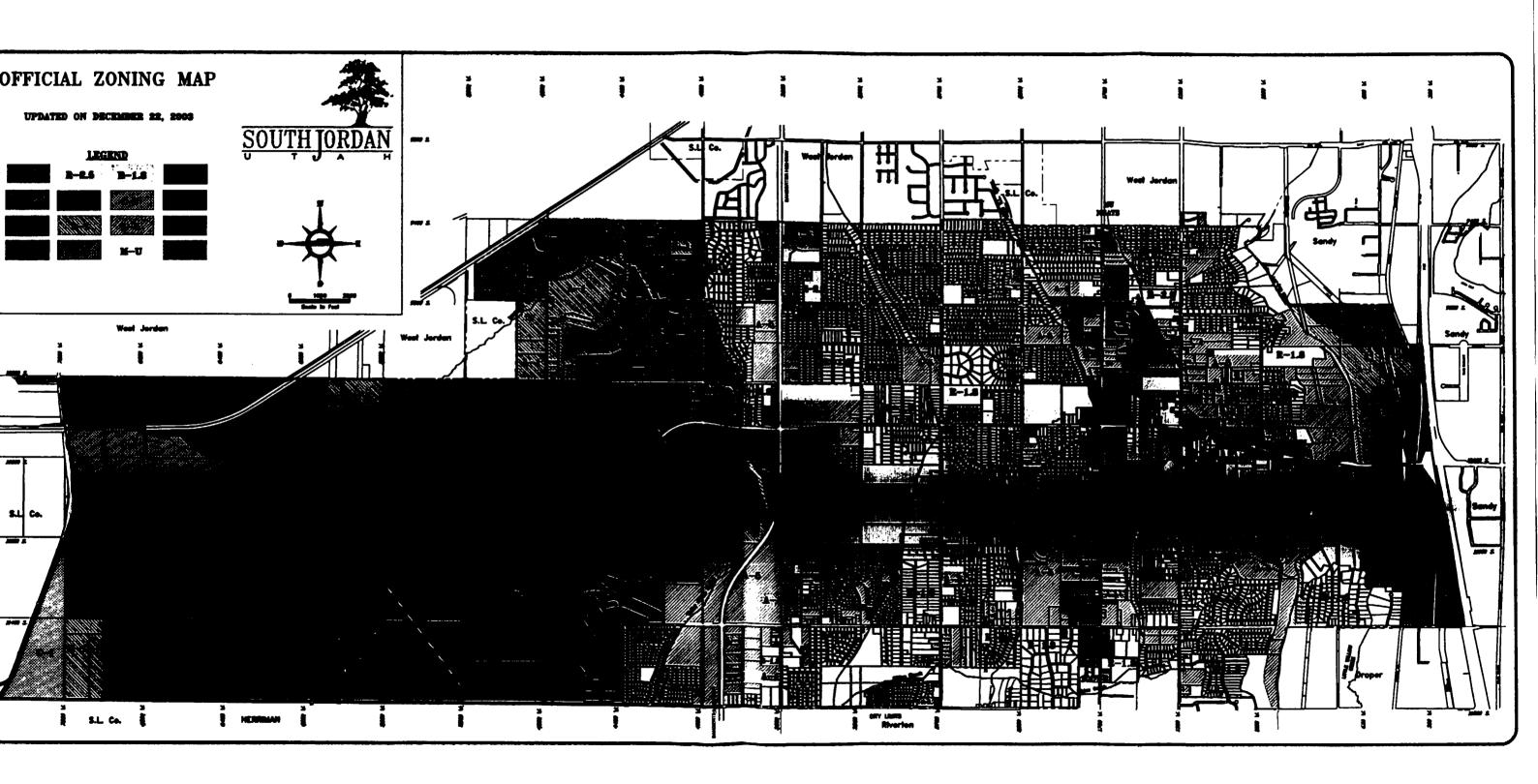


SPOTTERS LOAD CHECK REPORT

Date	Time	Company
Truck #	Driver	Weight
Origin		
Waste De	scription	<u>Unacceptable Waste</u>
	Glass Insulation Metals Paper Paint cans empty/dry out Pipe Plastic Roofing material Rubber Sheetrock Toys Wire Wood Yard Waste Miscellaneous	☐ Batteries ☐ Fluorescent lights ☐ Freon ☐ Medical Waste ☐ Oil ☐ Paint cans ☐ full - wet ☐ Solvents ☐ Tires ☐ Miscellaneous
Spotter Signa	ature	

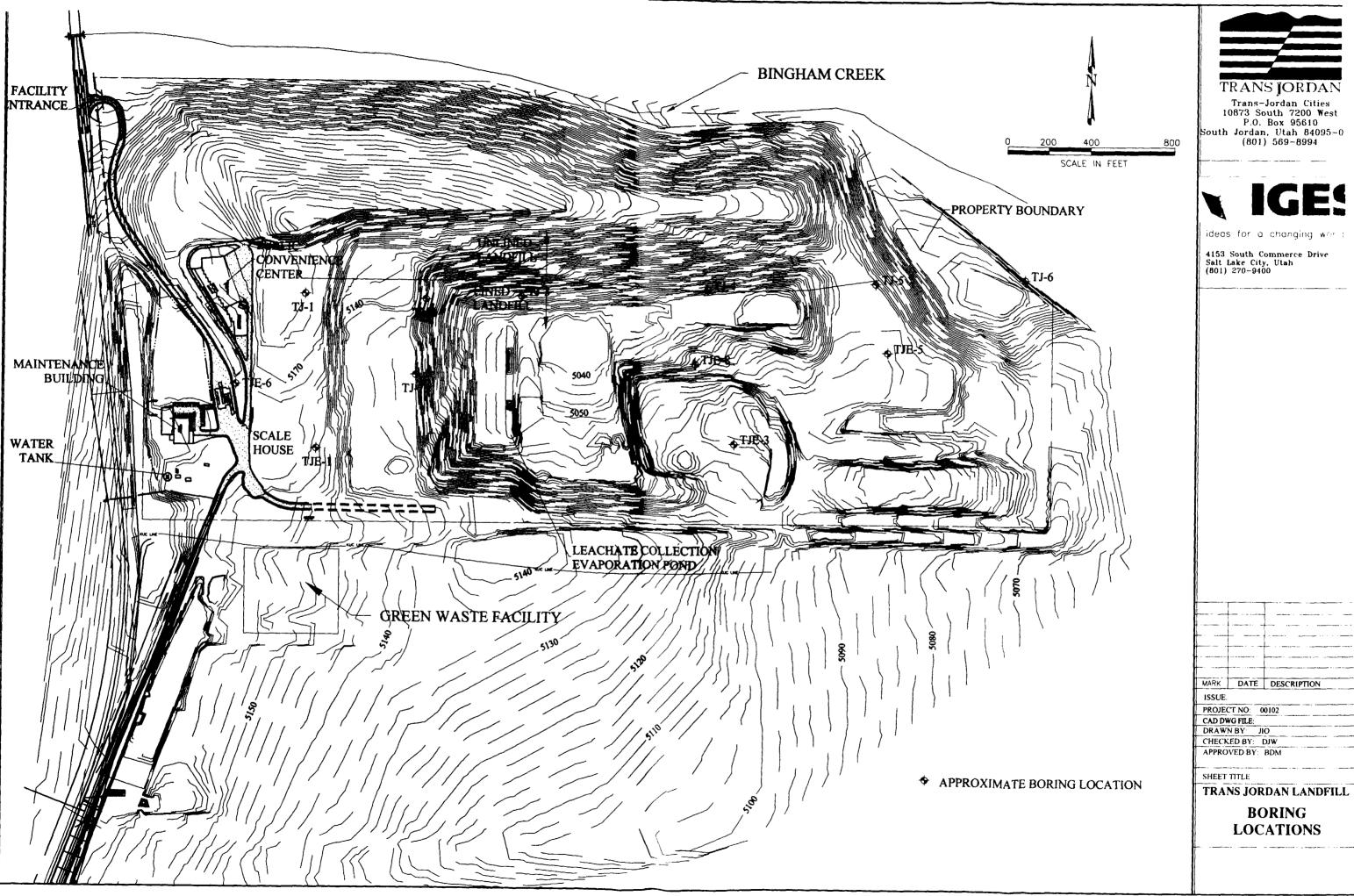
APPENDIX F – LOCAL ZONING





APPENDIX G – TEST PIT & BORING INFO. / GEOLOGIC MAPS





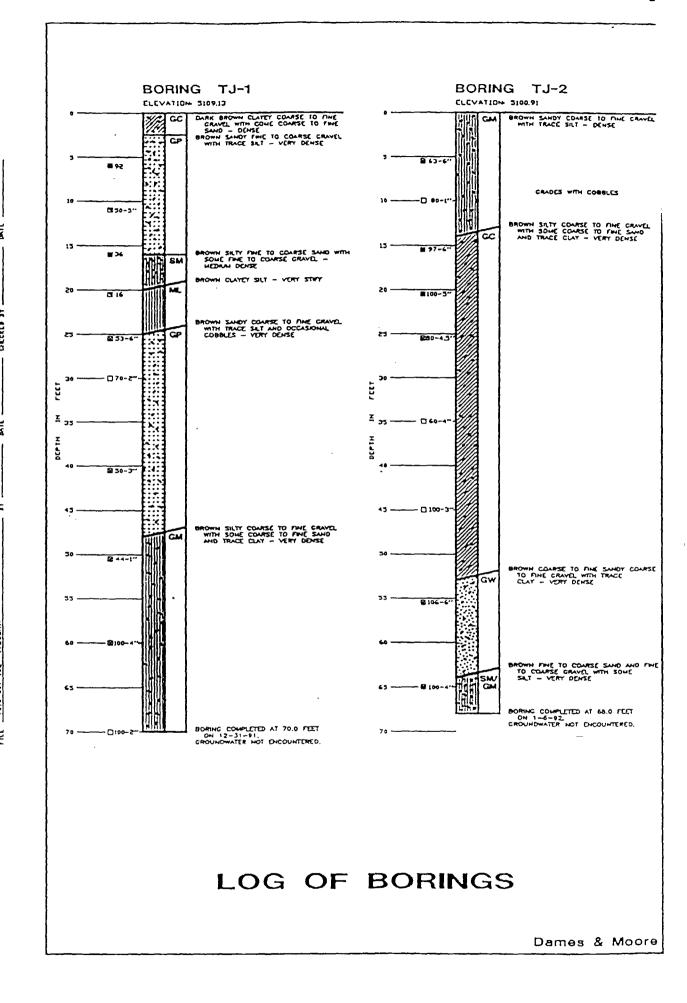


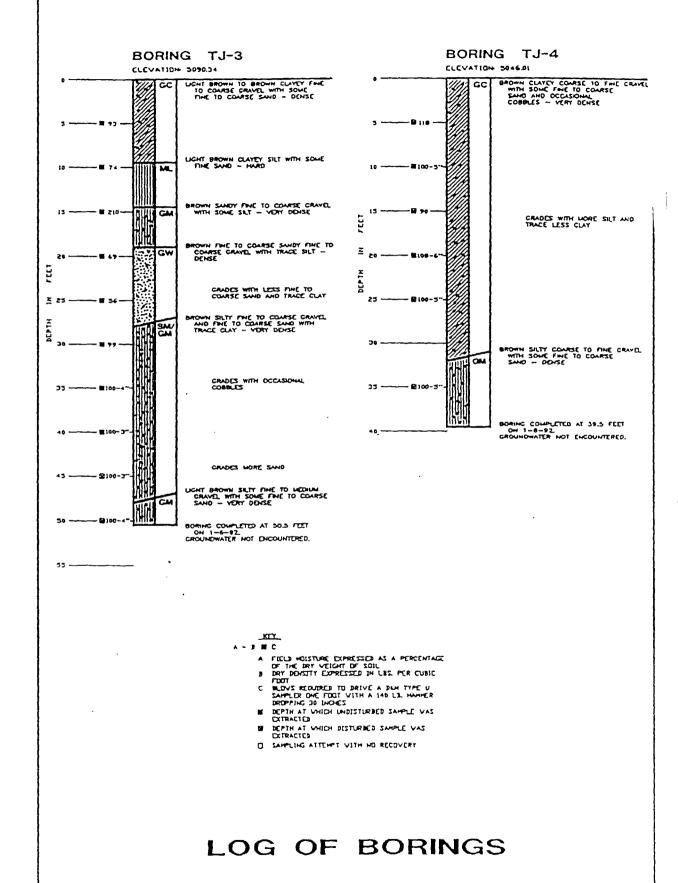


MA.	JOR DIVI	SIONS	GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
		CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GRAVEL AND	(LITTLE OR NO PINES)		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
COARSE GRAINED SOILS	GRAVELLY SOILS	GRAVELS WITH		GM	SILTY CRAVELS, CRAVEL—SAND— SILT MIXTURES
30123	MORE THAN SOX OF COARSE FRAC- TION RETAINED ON No. 4 SIEVE	(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL-SAND- CLAY MIXTURES
		CLEAN SAND		sw	WELL-CRADED SANDS, CRAVELLY SANDS, LITTLE OR NO FINES
	SAND AND	(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SANDY SOILS	SANDS WITH FINES		SM	SILTY SANDS, SAND-SILT MIXTURES
UDRE THAN SOT. OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN SOX OF COARSE FRAC- TION PASSING No. 4 SIEVE	(APPRECIABLE AMOUNT OF FINES)		sc	CLAYEY SANDS, SAND-CLAY MIXTURES
				ML	INORGANIC SILTS AND VERY FINE SAND, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
FINE	SILTS AND CLAYS	FE22 LIMM 20		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLAS— TICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
GRAINED SOILS				OL	ORCANIC SILTS AND ORCANIC SILTY CLAYS OF LOW PLASTICITY
				мн	INORGANIC SILTS. MICACEOUS OR DIATOMA— CEOUS FINE SAND OR SILTY SOILS
	SILTS AND CLAYS	LIQUID LIWIT CREATER THAN 50		СН	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
NORE THAN SOX OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	HORE THAN SOE OF MATERIAL IS SMALLER THAN No.			ОН	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HICH ORGANIC CONTENTS

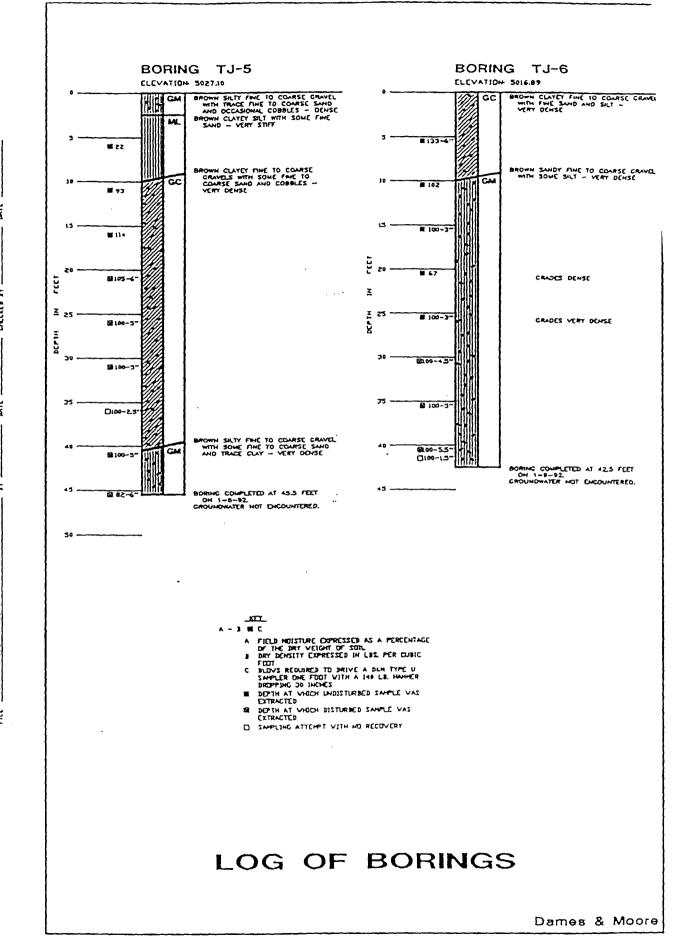
NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

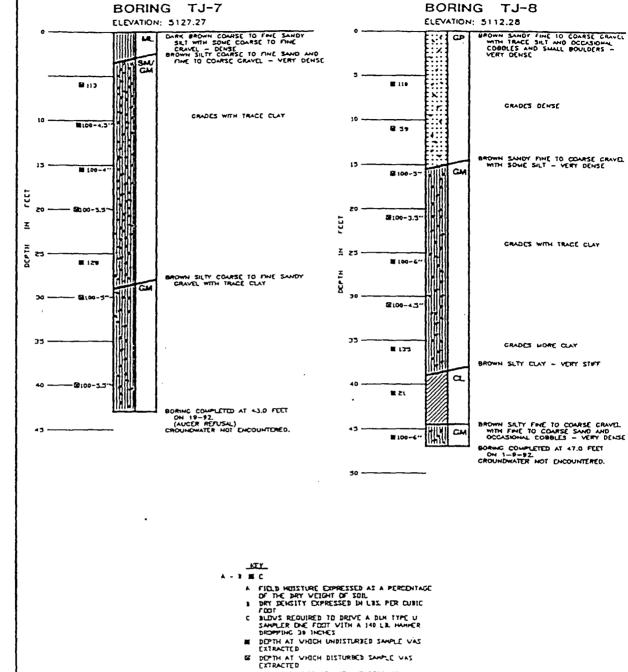
UNIFIED SOIL CLASSIFICATION SYSTEM





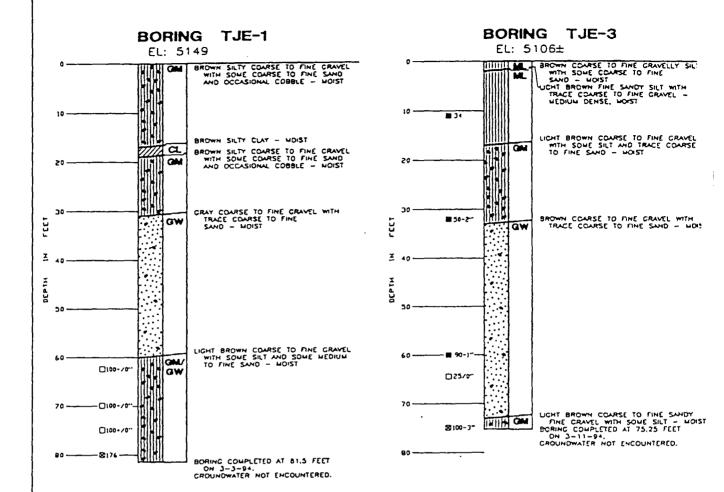
Dames & Moore





LOG OF BORINGS

D SAMPLING ATTEMPT VITH HO RECOVERY



KEY

A - B E C

- A FIELD HOISTURE EXPRESSED AS A PERCENTAGE
 OF THE DRY VEIGHT OF SOIL

 B DRY DENSITY EXPRESSED IN LBS. PER CUBIC
 FOOT

 C BLOWS REQUIRED TO DRIVE A DLM TIPE U
 SAMPLER DNE FOOT VITH A 140 LB. HAMMER
 DROPPING 30 INCHES

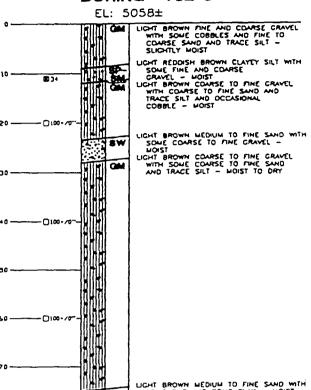
 B DEPTH AT VMICH UNDISTURBED SAMPLE VAS
 EXTRACTED

 STORM DE ALTERNI VITH AC DESCRIPENT.

- O SAMPLING ATTEMPT VITH NO RECOVERY

LOG OF BORINGS





0100-70

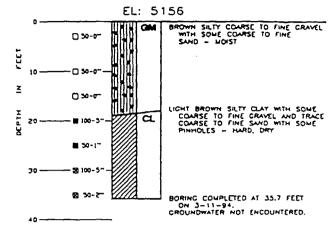
- 🗆 100 • 10

8C

RP

æ

BORING TJE-6



LIGHT BROWN LIEDIUM TO FINE SAND MITH SOME SILT AND SOME CLAY - MOIST

UCHT BROWN MEDIUM TO FINE SAND WITH . SOME FINE CRAVEL - MOIST

LIGHT BROWN COARSE TO FINE GRAVEL WITH SOME COARSE TO FINE SAND - MOIST

BORING COMPLETED AT 100.0 FEET ON 3-9-94. CROUNDWATER NOT ENCOUNTERED.

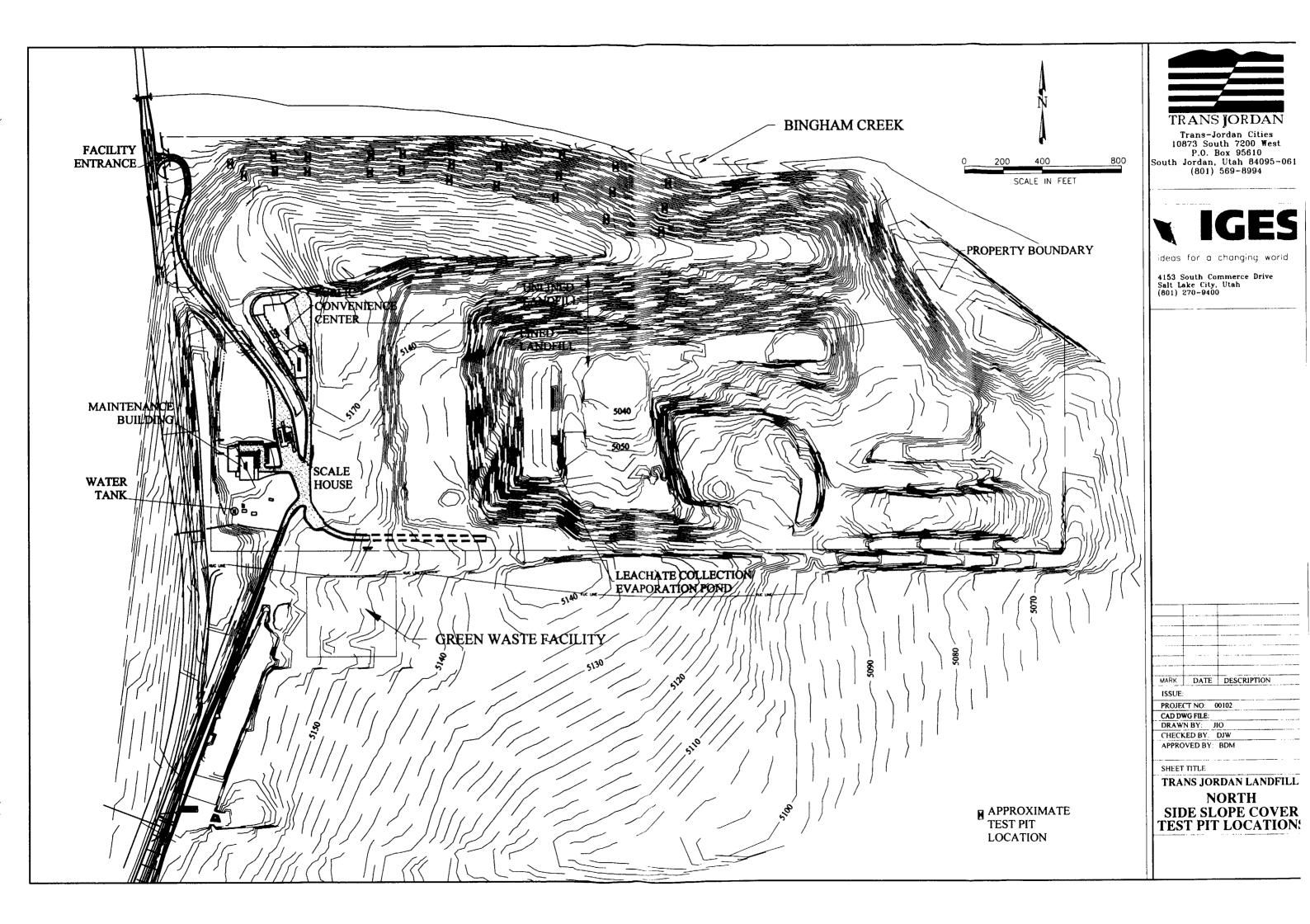
KEY - R = C

- A FIELD MOISTURE EXPRESSED AS A PERCENTAGE OF THE DRY VEIGHT DF SOIL BORY DENSITY EXPRESSED IN LBS. PER CUBIC FOOT
- F DOT

 C BLOWS REQUIRED TO DRIVE A DEM TYPE U
 SAMPLER DNE FDOT VITH A 140 LB. HAMMER
 DROPPING JO INCHES

 DEPTH AT WHICH UNDISTURBED SAMPLE VAS
 EXTRACTED
- 8 DEPTH AT WHICH DISTURBED SAMPLE WAS EXTRACTED
- D SAMPLING ATTEMPT WITH NO RECOVERY

LOG OF BORINGS



APPENDIX H – CLOSURE / POST CLOSURE COSTS

PHASE A

DATE TO BE CLOSED =

Summer 2004

AREA TO BE CLOSED = APP. PERIMETER =

740,000 SQ FT 2,500 FT

Section 1.0 - Engineering

	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	Topographic Survey	LS			
1.2	Boundary Survey for Closure	NA			
1.3	Site Evaluation	NA			
1.4	Development of Plans (Cover and Gas Collection)	LS	\$30,000	1]	\$30,000
1.5	Contract Administration - (Bidding and Award)	LA	\$5,000	1	\$5,000
1.6	Administrative Costs - (Certification of Plant Cover and Closure Notice)	LS	\$5,000		\$5,000
1.7	Project Management - (Construction Observation and Testing)	LS	\$20,000	1	\$20,000
1.8	Monitor Well Consultant Cost	NA			5 0
1.9	Other Environmental Permit Costs	NA			\$0
			Engin	eering Subtotal	\$60,000

Section 2.0 - Construction

Amm to	Description 2	Unit Measure	. Cost/Unit	No. Units	Total Cost
.1	Final Cover System				
•	Time Cover System				
211	Site Preparation/ Site Regrading	ACRE	\$1,000	170	\$16,98
	Gas Collection Layer/Pipes	Included below			S
	Low permeability Layer (Soil - If Applicable)				
2.7.3		NA			S
<u> </u>		NA			s
		NA			S
		NA			S
	 	NA			S
	Low permeability Layer (Synthetic - If Applicable)				
2,11.		NA			S
		SQ FT	\$0.45	740,000	\$333,00
		SQFT	\$0 40	740,000	\$296,00
	Drainage Layer (Soil - If Applicable)				
	Geotextile	NA			
		NA			5
	Drainage Layer (Synthetic - If Applicable)				
	Geotextile	NA			
	Geonet/Geocomposite	SQ FT	\$0.40	740,000	\$296,00
	Erosion Protection Soil Layer				
	Soil Purchase	NA			
i		CY	\$0.50	68,519	\$34,25
	Soil Transportation	CY	\$1.00	68,519	\$68,51
	Soil Placement	CY	\$0.75	68,519	\$51,38
	Soil Amendment (compact)	CY			- :
	Topseil Lever	1			
	Soil Purchase	NA			\$
	Soil Processing (load)	CY	\$0.50	13,704	\$6,85
	Soil Transportation	CY	\$1.00	13,704	\$13,70
	1 Soil Placement	CY	\$0.75	13,704	\$10,27
	: Soil Amendment	NA .			
	Revenuelon				
	Sooding	ACRE	\$800	17.0	\$13,59
	Portifizing	ACRE	\$800	17.0	\$13.59
	c Mulch	ACRE	\$200	17.0	\$3,3
	d Tacifier	ACRE	\$200	17.0	\$3,3
2.2	Stormwater Protection Structures				
	· · · · · · · · · · · · · · · · · · ·	LS	\$25	125	\$3,1:
	a Culverts b Pipes	LS	\$10	1,500	\$15,0
	c Ditches/Berms	FT	\$5	2,500	\$12,5
	d Detention Basins	NA NA			
-					
2.3	Gas Collection System	10.1 4.44 6 3			
	a Design	included in Section	s7,500	. 17	\$127,4
	b Additional Gas Collection Wells and Connection	EA .	\$7,500	17	\$127,4
	c THOX Unit - (Optional)	LS	\$230,000		\$250,0
2.4	Leachate Collection System				
	a Design	NA	ļ		
	b Additional Equipment / Installation	NA			
2.5	Groundwater Monitoring System	<u>. </u>	L		
	a Monitor Well Installation	NA			
	b Monitor Well Abandonment	NA			
2.6	Site Security				
	a Lighting, signs, etc	NA			
	b Fenome and Gates	NA NA	<u> </u>		
	Miscellaneous	1	 		
77			1	1 .	
2.7		i c	610,000		CIO
	a Performance Bonds b Contract/Legal fees	LS LS	\$10,000 \$5,000		\$10,0 \$5,0

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET

FT - FEET
ASSUMPTIONS
Ditch has 10 sq ft per lineal foot
Ditch has gravel in geocell over GCL
One gas collection well per acre
\$7,500 per well includes cost of piping and connection to existing system

Total

\$1,644,000 \$164,400 \$1,808,400

10% Contingency Subtotal Closure Cost

THOX - Thermal Oxidation Unit ASSUMPTION Only one unit necessary for entire site.

LMOP program may negate need for THOX unit

PHASE B

DATE TO BE CLOSED =

Summer 2005

AREA TO BE CLOSED -APP. PERIMETER=

250,000 SQ FT 1,500 FT

Section 1.0 - Engineering

A Bank	Description *	Unit Measure	Cost/Unit	Total Golf
1.1	Topographic Survey	LS		
1.2	Boundary Survey for Closure	NA		
1.3	Site Evaluation	NA		
1.4	Development of Plans (Cover and Gas Collection)	LS	\$30,000	\$30,000
1.5	Contract Administration - (Bidding and Award)	LA	\$5,000	\$5,000
1.6	Administrative Costs - (Certification of Flaat Cover and Closure Notice)	LS	\$5,000	\$5,000
1.7	Project Management ~ (Construction Observation and Testing)	LS	\$20,000	\$20,000
1.8	Monitor Well Consultant Cost	NA		\$0
1.9	Other Environmental Permit Costs	NA		\$0
			Engineering Subtota	\$60,000

Section	2.0	- Con	struction
---------	-----	-------	-----------

	Description	Unit Measure	Cost/Unit +	~No Units * #	Total Con
1	Final Cover System				
	Transcorer Bysical				
2.1.1	Site Preparation/ Site Regrading	ACRE	\$1,000	5 7	\$5,
	Gas Collection Layer/Pipes	Included below	3.,000	 +	
	Low permeability Layer (Soil - If Applicable)	Included octor			
	Soil Purchase	NA NA			
<u> </u>		NA NA		—— -	
		NA NA			
	· · · · · · · · · · · · · · · · · · ·	NA NA			
	 	NA NA	-		
	Low permeability Laver (Synthetic - If Applicable)	- NA			
		NA NA		 +	
- i			50.45	250,000	£112
	· · · · · · · · · · · · · · · · · · ·	SQFT	\$0.45	250,000	\$112
		SQFT	\$0 40	250,000	\$100
	Drainage Layer (Soil - If Applicable)				
		NA .			
t		NA NA			
	Drainage Layer (Synthetic - If Applicable)				
_	Geotextile	NA			
	Geonet/Geocomposite	SQ FT	\$0 40	250,000	\$100
	Erosion Protection Soil Layer				
		NA NA			
		CY	\$0 50	23,148	\$11
	Soil Transportation	CY	\$1.00	23,148	\$23
	1 Soil Placement	CY	\$0.75	23,148	\$17
	Soil Amendment (compact)	CY			
2.1.8	Topsoil Layer			T	
	a Soil Purchase	NA			
1	Soil Processing (load)	CY	\$0 50	4,630	\$2
	Soil Transportation	CY	\$1.00	4,630	\$4
	d Soil Placement	CY	\$0.75	4,630	\$3
	e Soil Amendment	NA			
2.7.9	Revetation				
	a Seeding	ACRE	\$800	5.7	<u>\$4</u>
	Fertilizing	ACRE	\$800	5.7	
	c Mulch	ACRE	\$200	5.7	\$1
	d Tacifier	ACRE	\$200	5.7	\$1
!	Stormwater Protection Structures				
		LS	\$25	75	\$1
	b Pipes	LS	\$10	900	\$9
	c Ditches/Berms	FT	\$5	1,500	S:
	d Detention Basins	NA NA		0000	
		- NA			
,	Gas Collection System				
	a Design	Included In Section			
	Additional Gas Collection Wells and Connection	EA	\$ 7,500	_6	\$43
ļ	Leachate Collection System			_	
	a Design	NA			
	b Additional Equipment / Installation	NA			
;	Groundwater Monitoring System				
•	a Monitor Well Installation	NA .			
	b Monitor Well Abandonment	NA NA			
	Site Security	1,0			
<u> </u>					
	a Lighting, signs, etc	NA			
	b Fencing and Gates	NA		1	
<u> </u>	Miscellaneous			i	
	a Performance Bonds	LS	\$10,000	1	SI
	b Contract/Legal fees	LS	\$5,000	11	S

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET
ASSUMPTIONS
Ditch has 10 set 10 per lim

Ditch has 10 sq ft per lineal foot

Ditch has gravel in geocell over GCL

One gas collection well per acre

\$7,500 per well includes cost of piping and connection to existing system

\$528,637

10% Contingency Subtotal Closure Cost

\$52,864 \$581,500

PHASE C

DATE TO BE CLOSED -

Summer 2007

AREA TO BE CLOSED = APP. PERIMETER -

325,000 SQ FT 500 FT

Section 1.0 - Engineering

Them	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	Topographic Survey	LS			
1.2	Boundary Survey for Closure	NA			
1.3	Site Evaluation	NA			
1.4	Development of Plans (Cover and Gas Collection)	LS	\$30,000	l l	\$30,000
1.5	Contract Administration - (Bidding and Award)	LA	\$5,000	1	\$5,000
1.6	Administrative Costs - (Certification of Plani Cover and Closure Notice)	LS	\$5,000	. 1	\$5,000
1.7	Project Management - (Construction Observation and Testing)	LS	\$20,000	1	\$20,000
1.8	Monitor Well Consultant Cost	NA			<u>\$0</u>
1.9	Other Environmental Permit Costs	NA			\$0
			Engi	eering Subtotal	\$60,000

Section	2.0	C		
Section	Z.U	- COR	ISTruc	TION

Itom	Description	*Unit Messure	CosVUnit	No Units	Total Cost
2.1	Final Cover System			1	
	That Cover Dysem				
2.1.1	Site Preparation/ Site Regrading	ACRE	\$1,000	7.5	\$7,46
	Gas Collection Layer/Pipes	Included below			S
2.1.3	Low permeability Layer (Soil - If Applicable)				
2		NA			
Ъ	Soil Processing (load)	NA			
c	Soil Transportation	NA			
d		NA			\$
c	Soil Amendment (compact)	NA			
2.1.4	Low permeability Layer (Synthetic - If Applicable)				
2	Geotextile	NA			
b	GCL	SQ FT	\$0.45	325,000	\$146,2
c	Geomembrane (HDPE,PVC,LLDPE,ec)	SQ FT	\$0 40	325,000	\$130,0
2.1.5	Drainage Layer (Soil - If Applicable)				
2	Geotextile	NA			
ь	Sand/Gravel	NA			
2.1.6	Drainage Layer (Synthetic - If Applicable)				
		NA			
b		SQ FT	\$0.40	325,000	\$130,0
2.1.7	Erosion Protection Soil Layer				
	Soil Purchase	NA			
b	Soil Processing (load)	CY	\$0 50	30,093	\$15,0
c	Soil Transportation	CY	\$1.00	30,093	\$30,0
d	Soil Placement	CY	\$0.75	30,093	\$22,5
е	Soil Amendment (compact)	CY			
2.1.8	Topsoil Laver				
	Soil Purchase	NA			
Ь	Soil Processing (load)	CY	\$ 0 50	6,019	\$3,0
C		CY	\$1.00	6,019	\$6,0
d	Soil Placement	CY	\$0.75	6,019	\$4,5
- 6	Soil Amendment	NA			
2.1.9	Reversation				
	Sooding	ACRE	\$800		\$5,9
b		ACRE	\$800		\$5,9
	Mulch	ACRE	\$200		\$1,4
	Tacifier	ACRE	\$200	7.5	\$1,4
2.2	Stormwater Protection Structures				
	Culverts	LS	\$25	25	\$6
b		LS	\$10	300	\$3,0
		FT	\$5	500	\$2,5
d		NA			
2.3	Gas Collection System				
	Design	Included In Secti	on 1 0	<u> </u>	
	Additional Gas Collection Wells and Connection	EA	\$7,500	7	\$ 55,9
2.4	Leachate Collection System	<u>†-::</u>	1	T -	
	Design	NA NA	 	1	
	Additional Equipment / Installation	NA NA	 	 	
		100	t	 	
2.5	Groundwater Monitoring System	-	 	 	
	Monitor Well Installation	NA NA	[
	Monitor Well Abandonment	NA	 	 	ļ
2.6	Site Security				
	a Lighting, signs, etc.	NA	l	ļ	ļ
	Fencing and Gates	NA			ļ
2.7	Miscellaneous	1	l	l	L
-	Performance Bonds	LS	\$10,000) I	\$10,
	Contract/Legal fees	LS	\$5,000	ol i	\$5,
	-		Cons	truction Subtotal	\$586,9

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET
ASSUMPTIONS
Ditch has 10 sq ft per lineal foot

Ditch has gravel in geocell over GCL

One gas collection well per acre \$7,500 per well includes cost of piping and connection to existing system

10% Contingency Subtotal Closure Cost

\$646,965 \$64,697 \$711,662

PHASE D

DATE TO BE CLOSED -

Summer 2012

AREA TO BE CLOSED = APP. PERIMETER =

617,000 SQ FT 500 FT

Section 1.0 - Engineering

2000	Description	STREET, STREET, STREET,	The second second second	AUTEUR TE THE PERSON
11. 20 Oct	234 a.s. Martines of the control of	-9 : COM MCDAIC	COSPORAL -	Marchanta a distriction const.
1.1	Topographic Survey	LS		
1.2	Boundary Survey for Closure	NA		l
1.3	Site Evaluation	NA		
1.4	Development of Plans (Cover and Gas Collection)	LS	\$30,000	1 \$30,000
1.5	Contract Administration - (Bidding and Award)	LA	\$5,000	1 \$5,000
1.6	Administrative Costs - (Certification of Fluxi Cover and Closure Notice)	LS	\$5,000	1 \$5,000
1.7	Project Management - (Construction Observation and Testing)	LS	\$20,000	1 \$20,000
1.8	Monitor Well Consultant Cost	NA		\$0
1.9	Other Environmental Permit Costs	NA		So So
			Enginee	ring Subtotal \$60,000

780000	0 - Construction Description	Link Measure	Cost/Unit	No Units	Total Cours
		Cult Mosaus	COST CHILI;		30
.1	Final Cover System				
	C. B. J. (Ch. B. t.	ACRE	\$1,000	14.2	514,164
	Site Preparation/ Site Regrading	included below	\$1,000	14 2	\$0
	Gas Collection Layer/Pipes	included below			30
	Low permeability Layer (Soil - If Applicable)	NA NA			50
		NA NA			\$0
b.	Soil Processing (load) Soil Transportation	NA NA			50
		NA NA			
<u>d</u>		NA NA			\$0
c		NA			
	Low permeability Laver (Synthetic - If Applicable) Geotextile	NA NA			\$0
b		SQFT	\$0.45	617,000	\$277,650
		SQ FT	\$0.40	617,000	\$246,800
	Drainage Laver (Soil - If Applicable)	- Pyri	30.40	017,000	\$240,800
2.1.3		NA NA			\$0
<u>a</u>		NA NA			50
	Drainage Laver (Symthetic - If Applicable)	130			
2.1.0		NA NA			\$0
b		SQFT	\$0.40	617,000	\$246,800
	Eresien Protection Seil Layer	34	30.40	017,000	\$2.10,000
		NA NA			50
a b		cy	\$0.50	57,130	\$28,565
c		CY	\$1.00	57,130	\$57,130
d		CY	\$0.75	57,130	\$42,847
<u>u</u>		CY		37,130	\$0
	Tessell Laver				
2.1.0	Soil Purchase	NA .			50
b		CY	\$0.50	11,426	\$5,713
	T	CY	\$1.00	11,426	\$11,426
<u>_</u>		CY	\$0.75	11,426	\$8,569
		NA NA	30.73	11,72,0	\$0,50
	Acressies.	IVA			
2.1.9		ACRE	\$800	14.2	\$11,331
	Fertilizing	ACRE	\$800	14.2	\$11,331
<u> </u>		ACRE	\$200	14.2	\$2,833
<u>`</u>		ACRE	\$200	14.2	\$2,833
2.2	Stormwater Protection Structures	- ACAE			42,000
			\$25	25	\$625
<u>a</u>		LS	\$10	300	\$3,000
		LS FT	\$5 \$5	500	\$2,500
<u> </u>		NA NA		300	\$2,500
d					
2.3	Gas Collection System				
2.3	Gas Collection System Design	Included In Section			\$100.77
2.3 2	Gas Collection System Design Additional Gas Collection Wells and Connection		on 1 0 \$7,500	14	\$106,23
2.3	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System	Included In Section		14	\$106,23
2.3 2 b 2.4	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design	Included In Section EA		14	\$106,23 \$
2.3 t 2.4	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design Additional Equipment / Installation	Included In Section		14	\$106,23
2.3 t 2.4	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design	Included In Section EA		14	\$106,23 \$
2.3 t 2.4	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design Additional Equipment / Installation Groundwater Monitoring System	Included In Section EA		14	\$106,23 \$ \$ \$
2.3 b 2.4 t 2.5	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design Additional Equipment / Installation Groundwater Monitoring System	Included In Section EA NA NA		14	\$106,23 \$
2.3 t 2.4 t 2.5	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design Additional Equipment / Installation Groundwater Monitoring System Monitor Well Installation Monitor Well Abandonment	Included In Section EA NA NA NA		14	\$106,23 \$ \$
2.3 b 2.4 1 2.5 2.6	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design Additional Equipment / Installation Groundwater Monitoring System Monitor Well Installation Monitor Well Abandonment Site Security	Included In Secti EA NA NA NA		14	\$106,23 \$ \$ \$ \$
2.3 t 2.4 2.5 t 2.5	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design Additional Equipment / Installation Groundwater Monitoring System Monitor Well Installation Monitor Well Abandonment Site Security Lighting, signs, etc	Included In Secti EA NA NA NA		14	\$106,23 \$ \$
2.3 t 2.4 4 t 2.5	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design Additional Equipment / Installation Groundwater Monitoring System Monitor Well Installation Monitor Well Abandonment Site Security Lighting, signs, etc Fencing and Gates	Included In Secti EA NA NA NA		14	\$106,23 \$ \$ \$ \$ \$
2.3 2.4 2.4 4 2.5 4 2.6 2.7	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design Additional Equipment / Installation Groundwater Monitoring System Monitor Well Installation Monitor Well Abandonment Site Security Lighting, signs, etc Fencing and Gates Miscellaneous	Included In Section EA NA NA NA NA NA NA NA NA	\$7,500		\$106,23 \$ \$ \$ \$ \$ \$
2.3 2.4 2.4 2.5 2.5 2.6 2.7	Gas Collection System Design Additional Gas Collection Wells and Connection Leachate Collection System Design Additional Equipment / Installation Groundwater Monitoring System Monitor Well Installation Monitor Well Abandonment Site Security Lighting, signs, etc Fencing and Gates	Included In Secti EA NA NA NA		1	\$106,23 \$ \$ \$ \$ \$

1.S - LUMP SUM

1.S - LUMP SUM

NA - NOT APPLICABLE

EA - EACH

CY - CUBIC YARD

FT - FEET

ASSUMPTIONS

Ditch has 10 sq ft per lineal foot

Ditch has gravel in geocell over GCL

One gas collection well per acre
\$7,500 per well includes cost of piping and connection to existing system

Total

10% Contingency Subtotal Closure Cost

\$115,535 \$1,270,886

PHASE E

DATE TO BE CLOSED -

Summer 2017

AREA TO BE CLOSED = APP. PERIMETER -

700,000 SQ FT

500 FT

Section 1.0 - Engineering

196	Distription -	Unit Measure	Cost/Usit No. Un	2270 July
1.1	Topographic Survey	LS		
1.2	Boundary Survey for Closure	NA		
1.3	Site Evaluation	NA		
1.4	Development of Plans (Cover and Gas Collection)	LS	\$30,000	1 \$30,000
1.5	Contract Administration - (Bidding and Award)	LA	\$5,000	1 \$5,000
1.6	Administrative Costs - (Certification of Final Cover and Cleasure Notice)	LS	\$5,000	1 \$5,000
1.7	Project Management - (Construction Observation and Testing)	LS	\$20,000	1 \$20,000
1.8	Monitor Well Consultant Cost	NA		SC
1.9	Other Environmental Permit Costs	NA		
			Engineering Sul	560,000

7 mm	.0 - Construction	Unit Measure	Cost/Unit	No Units 19	See Co.
.1	Final Cover System	, Cast Macan	10000 0000 7		
.1	ridai Cover System				
177	City Barrameton (City Brandilla	ACRE	\$1,000	16.1	\$16,07
	Site Preparation/ Site Regrading	Included below	31,000	10.1	\$10,07
2.1.2	Gas Collection Laver/Pipes Low permeability Laver (Soil - If Applicable)	Included below			
2.1.3	Soil Purchase	NA NA			Se
b		NA NA			
		NA NA			S
-		NA NA			S
	<u> </u>	NA.			S
	Low permeability Layer (Synthetic - If Applicable)				
3		NA.			S
b		SQFT	\$0.45	700,000	\$315,00
c		SO FT	\$0 40	700,000	\$280,00
	Drainage Laver (Soil - If Applicable)				
- 2		NA			\$
— ь		NA			S
	Drainage Layer (Synthetic - If Applicable)				
1		NA			S
ь		SQ FT	\$0.40	700,000	\$280,00
	Erosion Protection Soil Layer	-13-			
		NA			S
		CY	\$0.50	64,815	\$32,40
		CY	\$1.00	64,815	\$64,81
		CY	\$0.75	64,815	\$48,61
		CY			S
	Topsoil Layer				
	Soil Purchase	NA			s
ь		CY	\$0.50	12,963	\$6,48
		CY	\$1.00	12,963	\$12,96
		CY	\$0.75	12,963	\$9,72
	Soil Amendment	NA NA			S
	Reversation				
		ACRE	\$800	16.1	\$12,85
	Fortilizing	ACRE	\$800	16.1	\$12,85
	Mulch	ACRE	\$200	16.1	\$3,21
	Tacifier	ACRE	\$200	16.1	\$3,21
2.2	Stormwater Protection Structures				
		LS	\$25	25	\$62
	Pipes	LS	\$10	300	\$3,00
	 	FT	\$5	500	\$2,50
		NA			- ' '
2.3	Gas Collection System		<u> </u>		
	a Design	Included in Secti	on 1 0		
	b Additional Gas Collection Wells and Connection	EA EA	\$7,500	16	\$120,52
2.4	Leachate Collection System		¥,,500		J. 20,24
		····			
	Design Additional Equipment / Installation	NA NA	 		
		- NA	\vdash		
2.5	Groundwater Monitoring System	<u>_</u>			ļ
	Monitor Well Installation	NA	 		
	Monitor Well Abandonment	NA NA			
2.6	Site Security				L
	a Lighting, signs, etc	NA	L		
1	Fencing and Gates	NA			
2.7	Miscellaneous		I		l
	a Performance Bonds	LS	\$10,000	1	\$10,0
	b Contract/Legal fees	LS	\$5,000	1	\$5,0
	 			ruction Subtotal	

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EAC'H
CY - CUBIC YARD
FT - FEET
ASSUMPTIONS
Ditch has 10 sq ft per lineal foot

Ditch has gravel in geocell over GCL

One gas collection well per acre

\$7,500 per well includes cost of piping and connection to existing system

Total

\$1,299,858

10% Contingency Subtotal Closure Cost

\$129,986

\$1,429,844

PHASE F

DATE TO BE CLOSED =

Summer 2021

AREA TO BE CLOSED = APP. PERIMETER =

738,000 SQ FT 500 FT

Section 1.0 - Engineering

hen	Description	Unit Measure	Cost/Unit No Units	Josef Cole
1.1	Topographic Survey	LS	 	
1.2	Boundary Survey for Closure	NA		
1.3	Site Evaluation	NA	1	 .
1.4	Development of Plans (Cover and Gas Collection)	LS	\$30,000 1	\$30,000
1.5	Contract Administration - (Bidding and Award)	LA	\$5,000	\$5,000
1.6	Administrative Costs - (Certification of Final Cover and Closure Notice)	LS	\$5,000	\$5,000
1.7	Project Management - (Construction Observation and Testing)	LS	\$20,000 1	\$20,000
1.8	Monitor Well Consultant Cost	NA		\$0
1.9	Other Environmental Permit Costs	NA		\$0
			Engineering Subtotal	\$60,000

hom	Description	Unit Measure:	Cost/Unit	No Units	STORE COM
	Final Cover System				
	Site Preparation/ Site Regrading	ACRE	\$1,000	169	
	Gas Collection Layer/Pipes	Included below			
	Low permeability Laver (Sail - If Applicable)				
	Soil Purchase	NA NA			
	Soil Processing (load)	NA			
		NA NA			
	Soil Placement	NA			
		NA NA			
	Low permeability Laver (Synthetic - If Applicable)			ļ	
	Geotextile	NA .		718 000	\$332,1
	GCL	SQFT	\$0.45	738,000 738,000	
	Geomembrane (HDPE,PVC,L1DPE,etc)	SQFT	\$0.40	/38,000	\$293,2
	Drainage Layer (Soil - If Applicable)				
	Geotextile	NA			
	Sand/Gravel	NA NA		 	
	Drainage Laver (Synthetic - If Applicable)			 	
	Geotextile	NA OO FT	\$0 40	738,000	\$295,2
	Geonet/Geocomposite	SQFT	30 40	/38,000	3293,4
2.1.	Erosion Protection Soil Layer				
	a Soil Purchase	NA CY	\$0.50	68,333	\$34,
	Soil Processing (load)	CY	\$1.00		
	c Soil Transportation		\$0.75		
	d Soil Placement	CY	\$0.73	06,333	3312
	e Soil Amendment (compact)	CY		 	
	Tensell Laver				
	a Soil Purchase	NA MA	****	13.663	56
	b Soil Processing (load)	CY	\$0.50		
	c Soil Transportation	CY	\$1.00		
	d Soil Placement	СУ	\$0.75	13,667	310,
	e Soil Amendment	NA NA			
	Reverencies		5800	16.5	\$13.
	a Scoting	ACRE ACRE	\$800		
	b Fertilizing c Mulch	ACRE	\$200		
	c Mulch d Tacifier	ACRE	\$200		
		ACKE	3200	10.5	1 32
2	Stormwater Protection Structures			ļ	
	a Culverts	LS	\$25		
	b Pipes	LS	\$10		
	c Ditches/Berms	FT	\$5	300	\$2,
	d Detention Basins	NA NA			
.3	Gas Collection System		l	ļ	
	a Design	Included in Secti		ļ	
	b Additional Gas Collection Wells and Connection	EA	\$7,500	1	7 S12 7,
.4	Leachate Collection System	ii			1
-	a Design	NA			<u> </u>
	b Additional Equipment / Installation	NA			
.5	Groundwater Monitoring System				1
	a Monitor Well Installation	NA			J
	b Monitor Well Abandonment	NA			
.6	Site Security			7	7
	a Lighting, signs, etc	NA NA		 	
	b Fencing and Gates	NA NA	 	 	†
.7	Miscellaneous	THA	 	 	
.1			510.00	\	1 S 10
	a Performance Bonds b Contract/Legal fees	LS	\$10,000		1 \$10
		LS	1 55.000		

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET
ASSUMPTIONS
Ditch has 10 sq ft per lineal foot

Ditch has gravel in geocell over GCL

One gas collection well per acre

\$7,500 per well includes cost of piping and connection to existing system

\$1,366,018

10% Contingency Subtotal Closure Cost

\$136,602 \$1,502,619

PHASE G

DATE TO BE CLOSED = Summer 2025

AREA TO BE CLOSED = APP. PERIMETER =

733,000 SQ FT 500 FT

Section 1.0 - Engineering

1	Description of the second of t	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	Topographic Survey	LS			
1.2	Boundary Survey for Closure	NA			
1.3	Site Evaluation	NA			
1.4	Development of Plans (Cover and Gas Collection)	LS	\$30,000	i i	\$30,000
1.5	Contract Administration - (Bidding and Award)	LA	\$5,000	1	\$5,000
1.6	Administrative Costs - (Certification of Plant Cover and Closure Notice)	LS	\$5,000	1	\$5,000
1.7	Project Management - (Construction Observation and Testing)	LS	\$20,000	1	\$20,000
1.8	Monitor Well Consultant Cost	NA			\$0
1.9	Other Environmental Permit Costs	NA			\$0
			Eng	ineering Subtotal	\$60,000

Think:	Description	Unit Measure	Cost/Unit	No Uniti	Fotal Cost
.}	Final Cover System				
·	That cover bysen				
211	Site Preparation/Site Regrading	ACRE	\$1,000	16.8	\$16,82
	Gas Collection Laver/Pipes	Included below	41,1		
	Low permeability Layer (Soil - If Applicable)				
	a Soil Purchase	NA			5
	Soil Processing (load)	NA			\$
	Soil Transportation	NA NA			\$
	Soil Placement	NA			
	 	NA			5
	Low permeability Layer (Synthetic - If Applicable)				
	Geotextile	NA			
	GCL	SQ FT	\$0.45	733,000	\$329,85
		SQFT	\$0.40	733,000	\$293,20
	Drainage Laper (Soil - If Applicable)				
	a Geotextile	NA			- 1
	b Sand/Gravel	NA NA			
	Drainage Laver (Synthetic - If Applicable)	· · · · · · · · · · · · · · · · · · ·			
	2 Geotextile	NA			-
	b Geonet/Geocomposite	SQFT	\$0 40	733,000	\$293,20
	Eresien Protection Soil Laver	34.1	30 40	.22,000	52,5,20
	a Soil Purchase	NA			,
	b Soil Processing (load)	CY	\$0.50	67,870	\$33.93
	c Soil Transportation	CY	\$1.00	67,870	\$67,87
	d Soil Placement	CY	\$0.75	67,870	\$50,90
		CY	30.73	07,870	\$3,0,5
		<u> </u>			
2.1.8	Terseil Laver				
	a Soil Purchase	NA OW	\$0.50	13,574	\$6,71
	b Soil Processing (load)	CY	\$1.00	13,574	\$13,5
	c Soil Transportation	CY	\$0.75	13,574	\$10,1
	d Soil Placement	СҮ	30.73	13,374	\$10,10
	c Soil Amendment	NA NA			
	Reversation		4000		4:34
	a Scotling	ACRE	\$800	16.8	\$13,4
_	b Fertifizing	ACRE	0082		
	c Mulch	ACRE	\$200		
	d Tacifier	ACRE	\$200	16.8	\$3,3
1.2	Stormwater Protection Structures		L		
	a Culverts	LS	\$25		
	b Pipes	LS	\$10		
	c Ditches/Berms	FT	\$5	500	
	d Detention Basins	NA			
.3	Gas Collection System				
	a Design	Included In Secti	ion 1 0		
	b Additional Gas Collection Wells and Connection	EA	\$7,500	17	
.4	Leachate Collection System		 		
· ·	a Design	NA NA			_
	b Additional Equipment / Installation	NA NA			
		NA			
.5	Groundwater Monitoring System		ļ	!	
	a Monitor Well Installation	NA	<u> </u>		
	b Monitor Well Abandonment	NA NA	 	ļ	<u> </u>
.6	Site Security			L	
	a Lighting, signs, etc	NA			
	b Fencing and Gates	NA			
.7	Miscellaneous				
	a Performance Bonds	LS	\$10,000	1	\$10,
	b Contract/Legal fees	LS	\$5,000		\$5,
	U COMPANICA ICO			struction Subtota	

LS - LUMP SUM

NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET

ASSUMPTIONS

Ditch has 10 sq ft per lineal foot

Ditch has gravel in geocell over GCL

One gas collection well per acre \$7,500 per well includes cost of piping and connection to existing system

Total

10% Contingency Subtotal Closure Cost

\$135,731 \$1,493,044

PHASE H

DATE TO BE CLOSED = Summer 2029

AREA TO BE CLOSED -APP. PERIMETER -

1,249,000 SQ FT 1,250 FT

Section 1.0 - Engineering

- Ston	Description	Linit Measure	. Cont/Units 1 / No. Units 3	WASH CON Y
1.1	Topographic Survey	LS		
1.2	Boundary Survey for Closure	NA		
1.3	Site Evaluation	NA		
1.4	Development of Plans (Cover and Gas Collection)	LS	\$30,000	\$30,000
1.5	Contract Administration - (Bidding and Award)	LA	\$5,000	\$5,000
1.6	Administrative Costs - (Certification of Pinal Cover and Closure Notice)	LS	\$5,000	\$5,000
1.7	Project Management - (Construction Observation and Testing)	LS	\$20,000	\$20,000
1.8	Monitor Well Consultant Cost	NA		\$0
1.9	Other Environmental Permit Costs	NA		50
			Engineering Subtotal	\$60,000

C	3 0	C	
Section	2.U •	. C onsi	ructioi

	Description	-Unit Measure	Cost/Unit	No Units 1/4	Total Cos
	Final Cover System				
2,1,1	Site Preparation/ Site Regrading	ACRE	\$1,000	28 7	\$28,6
	Gas Collection Layer/Pipes	Included below			
	Low permeability Layer (Soil - If Applicable)				
	s Soil Purchase	NA			
	b Soil Processing (load)	NA			
	c Soil Transportation	NA		_	
	d Soil Placement	NA			
	e Soil Amendment (compact)	NA			
	Low permeability Layer (Synthetic - If Applicable)				
	a Geotextile	NA			
	b GCL	SOFT	\$0.45	1,249,000	\$562
	c Geomembrane (HDPE_PVC,LLDPE.esc .)	SQFT	\$0.40	1,249,000	\$499
	Drainage Layer (Soil - If Applicable)				
	a Geotextile	NA NA			
	b Sand/Gravel	NA			
	6 Drainage Layer (Synthetic - If Applicable)	- 85			
	a Geotextile	NA NA	 		
	b Geonet/Geocomposite	SOFT	\$0 40	1,249,000	\$499
	7 Erosion Protection Soil Layer	34.1.	30 70	.,242,000	• • • • • • • • • • • • • • • • • • • •
2.1.	a Soil Purchase	NA NA	 		
		CY	\$0.50	115,648	\$ 5
	b Soil Processing (load)	CY	\$1.00	115,648	\$11:
	c Soil Transportation		\$0.75	115,648	\$84
	d Soil Placement	ĊY	30.73	113,048	304
	e Soil Amendment (compact)	СҮ			
2.1.0	8 Tonsoil Laver		ļ		
	a Soil Purchase	NA NA			
	b Soil Processing (load)	CY	\$0.50	23,130	<u>\$1</u>
	c Soil Transportation	CY	\$1.00	23,130	
	d Soil Placement	CY	\$0.75	23,130	\$1
	e Soil Amendment	NA NA			
2.1.	9 Reverencies				
	a Seeding	ACRE	\$800	28.7	\$2
	b Fortilizing	ACRE	\$800	28.7	\$2
	c Mulch	ACRE	\$200	28.7	
	d Tacifier	ACRE	\$200	28.7	<u> </u>
;	Stormwater Protection Structures				ì
	a Culverts	LS	\$25	63	S
	b Pipes	LS	\$10	750	S
	c Ditches/Berms	FT	\$5	1,250	S
	d Detention Basins	NA			1
3	Gas Collection System		1		T
		Included in Sect	ion 1 0		
	a Design b Additional Gas Collection Wells and Connection	EA EA	\$7,500	29	\$21
		EA	1000		
•	Leachate Collection System		├		
	a Design	NA NA	 		
	b Additional Equipment / Installation	NA NA	 		
5	Groundwater Monitoring System				<u> </u>
	a Monitor Well Installation	NA	<u> </u>		L
	b Monitor Well Abandonment	NA			
6	Site Security				
	2 Lighting, signs, etc	NA NA	 		
	b Fencing and Gates	NA NA	1		1
7	Miscellaneous		 		
<i>'</i>		——— ——— ——	510,000		\$1
	a Performance Bonds	LS	\$10,000	1	5
	b Contract/Legal fees	LS	S5,000		\$2,20

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET
ASSUMPTIONS
Ditch has 10 sq ft per lineal foot

Ditch has gravel in geocell over GCL

One gas collection well per acre \$7,500 per well includes cost of piping and connection to existing system

10% Contingency Subtotal Closure Cost

\$2,264,880 \$226,488 \$2,491,368

LANDFILL POST-CLOSURE COSTS (30 YEARS)

Section 1.0 - Engineering

Atem ·	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	Post-Closure Plan	NA			\$0
	Annual Report (including results from gas, leachate, and ground water sampling - details of maintenance performed)	LS	\$5,000	30	\$150,000
a	Semiannual Site Inspections	LS	\$320	60	\$19,200
b	Plan Update	LS	\$200	30	\$6,000
			Engin	eering Subtotal	\$175,200

Section 2.0 - Gas Collection System - Sampling

lens v	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1 Sample Collection	1	 LS	\$320	120	\$38,400
2.2 Sample Analysis		 NA			\$0
2.3 Report (Part of Annu	al Report)				
		Gas Coll	ection System - Sar	npling Subtotal	\$38,400

Section 3.0 - Leachate Collection System - Sampling

alrem .	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
216	Sample Collection	IS	\$80	60	\$4,800
	Sample Analysis	NA NA	\$400	60	\$24,000
2.3 F	Report (Part of Annual Report)				
		Leachate Colle	\$28,800		

Section 4.0 - Ground Water Monitoring System - Sampling

Descriptions 11	Unit Measure	Cost/Unit	No Units	**Notal Cost
3.1 Sample Collection	LS	S 0	60	\$0
3.2 Sample Analysis	LS	\$0	120	\$(
3,3 Report (Part of Annual Report)	Ground Water Collec	tion System - Same	ling Subtotal	SC

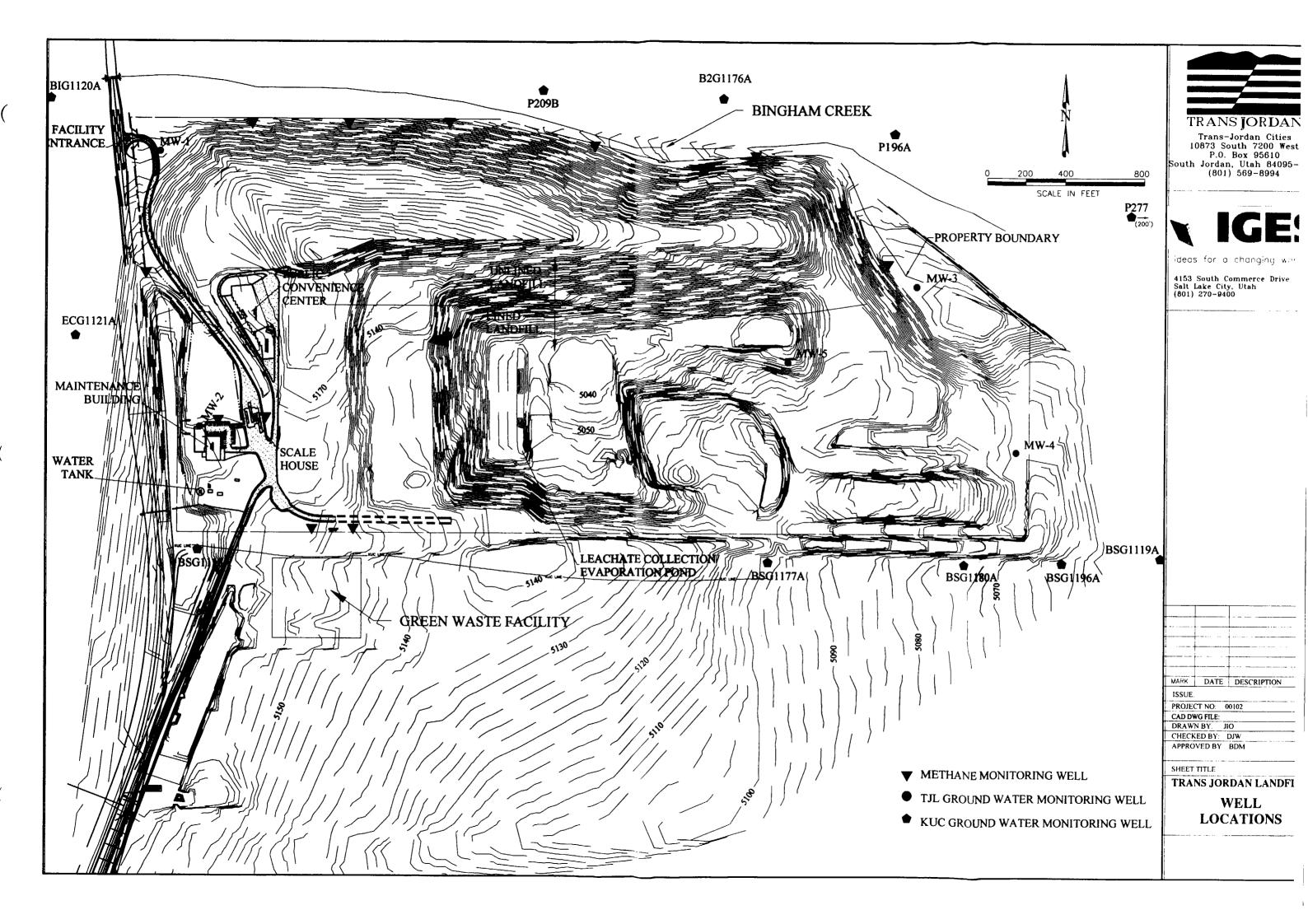
Section 5.0 - Facility Operations and Maintenance

地 溪	Description ()	Unit Measure:	Cost/Unit	No. Units	* Total Cost
4.1	Cover				
a	Soil Replacement	LS	\$1,000	30	\$30,00
_ b	Vegetation/Reseeding	LS	\$500	30	\$15,00
4.2	Storm Water Protection Structures				
a	Ditch and Culvert Maintenance	LS	\$500	30	\$15,00
b	Berm and Basin Maintenance	LS	\$500	30	\$15,00
4.3	Gas Collection System				
2	System Operation	NA	\$240	3120	\$748,80
b	System Repair	LS	\$2,000	30	\$60,00
4.4	Leachate Collection System				
8	System Operation	NA		30	
b	System Repair	NA		30	
4.5	Ground Water Monitoring System				
a	System Operation	NA		30	
b	System Repair	LS	\$500	30	\$15,0
4.6	Site Security				
a	Lighting, signs, etc	LS	\$500	30	\$15,0
ь	Fencing and Gates	1.5	\$500	30	\$15,0
4.7	Miscellaneous				
a					
b					
		Facility Ope	rations and Main	tenance Subtotal	\$928,8

Total \$1,171,200 10% Contingency

\$117,120 **Total Post-Closure Cost** \$1,288,320

APPENDIX I – WELL DATA



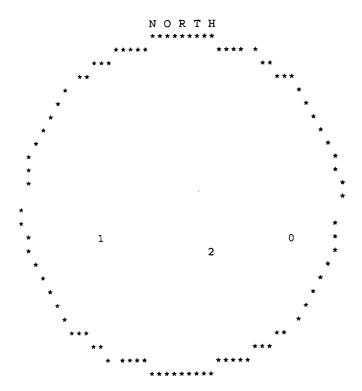
APPENDIX J – WATER RIGHTS



UTAH DIVISION OF WATER RIGHTS WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, MAR 17, 2003, 10:10 AM PLOT SHOWS LOCATION OF 6 POINTS OF DIVERSION

PLOT OF AN AREA WITH A RADIUS OF 3000 FEET FROM A POINT N 2456 FEET, E 189. FEET OF THE S4 CORNER, SECTION 15 TOWNSHIP 3S RANGE 2W SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 2000 FEET



UTAH DIVISION OF WATER RIGHTS NWPLAT POINT OF DIVERSION LOCATION PROGRAM

	WATER RIGHT	QUANTITY CFS AND/OR AC-							NT C			ION D	ESCRIP TWN		B&M	N	APTS PEEU PRRR	GТ
0	a24720	8.9600 WATER USE(S): MUNICIPAL	.00 Und	erground	Water Well	s (2-exi	s	874	W	389			3S DATE:				х	Х
		Kennecott Utah Copper Cor	poration		3315 West 3	595 South					ì	Magna				UT	84044-6	001
0	a26074	3.4200 WATER USE(S): OTHER	.00	12	- 1000		s	874	W	389		_	3S DATE:					х
		Kennecott Utah Copper Cor	poration	I	P.O. Box 60	01					ì	Magna				UT	84044-6	001
1	a24720	8.9600 WATER USE(S): MUNICIPAL	.00 Und	erground	Water Well	s (2-exi	s	882	E	1280			3S DATE:				х	x
		Kennecott Utah Copper Cor	poration	. 8	3315 West 3	595 South					ľ	Magna				UT	84044-6	001
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		Kennecott Utah Copper Cor	poration	. I	P.O. Box 60	01					ľ	Magna				UT	84044-6	001
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		Kennecott Utah Copper Cor	poration		3315 West 3	595 South					N	lagna				UT	84044-6	001
2	a26074	3.4200 WATER USE(S): OTHER	.00	12	- 1000		N	1568	E	670			3S DATE:	-	SL /200			x
		Kennecott Utah Copper Cor	porati <mark>on</mark>		P.O. Box 60	01					N	Magna			1	UT	84044-6	001

APPENDIX K – 2002 GROUNDWATER MONITORING REPORT





Intermountain GeoEnvironmental Services, Inc. 182 South 600 East, Suite 206, Salt Lake City, Utah 84102 Phone (801) 521-1800 | Fax (801) 521-2800

www.igesinc.com

Trans-Jordan Landfill 2002 Groundwater Monitoring Report

IGES Job No. 00102-001

February 20, 2003

Prepared for:

Trans-Jordan Cities

c/o Mr. Dwayne Woolley 10873 South 7200 West P.O. Box 95610-0610 South Jordan, Utah 84095

THIS DOCUMENT WAS PREPARED FOR USE ONLY BY THE CLIENT, ONLY FOR THE PURPOSES STATED, AND WITHIN A REASONABLE TIME FROM ITS ISSUANCE, PLEASE READ THE "LIMITATIONS" SECTION OF THIS REPORT

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF WORK

The purpose of this report is to present the results of recent groundwater analysis, including groundwater chemistry, depth to water and direction of flow under the Trans Jordan Landfill (TJL). This report summarizes any statistical changes that may have occurred during 2002. The period of review for this assessment is generally limited to the readings over the past year; however, the statistical assessment extends through the entire history of the sampling rounds.

The scope of work performed for this assessment includes a review of the 2002 sampling data, a statistical assessment of the readings, and the preparation of this report.

The recommendations contained in this report are subject to the limitations presented in the "Limitations" section of this report.

1.2 PROJECT DESCRIPTION

TJL is a municipal solid waste landfill located at 10873 South 7200 West, South Jordan, Utah, in Salt Lake County. TJL is located in Section 15, Township 3 South, Range 2 West.

TJL currently has one up gradient and three down gradient monitoring wells on the property that are utilized for groundwater monitoring and sampling. The up gradient well is identified as TJMW-2 while the down gradient wells are TJMW-3, TJMW-4 and TJMW-5. These sampling wells were originally installed based on the predominant groundwater flow being west to east. However, the construction of a groundwater cutoff wall completed by Kennecott Utah Corporation (KUC), several years of below average precipitation, and down gradient water usage all have contributed to the drop in water levels and have altered the groundwater gradient at the site. Because of these activities and possible other unknown conditions, the TJL monitoring wells are drying up and the groundwater gradient appears to be trending south. The Groundwater Contour Maps and Field Sampling Data Summary Sheets located in Appendix D show the apparent flow direction and groundwater elevations over time.

TJMW-1 was originally installed as an up gradient well but is currently no longer used for groundwater sampling. However, groundwater elevations are measured in TJMW-1 quarterly. This well did not accurately represent general background water conditions as compared to other historic groundwater quality data from monitoring wells in the area. TJMW-2 was installed in January of 1995 and has since served as the up gradient well for the landfill.

In 2002, four sampling rounds were completed for TJMW-4 and TJMW-5. One sampling round was completed for TJMW-2 and no rounds were completed for TJMW-3. TJMW-2 dried up and could not be sampled during the final three rounds in 2002 and TJMW-3 dried up and could not be sampled at all during the year 2002. The dates, wells sampled and analysis performed for these rounds are summarized below:

Table 1 - Summary of 2002 Groundwater Sampling Events

Sampling Date	Well(s) Sampled	Analysis Performed
3/05/02	TJMW-2,	Complete
	TJMW-4 & TJMW-5	
6/28/02	TJMW-4 & TJMW-5	Complete
9/24/02	TJMW-4 & TJMW-5	Complete
12/10/02	TJMW-4 & TJMW-5	Complete

The results of the analyses performed on the groundwater samples were reviewed and constituents of concern were identified. To aid in identifying constituents of concern, the following steps were implemented in our assessment:

- Step 1 Identify constituents with laboratory detectable concentrations for each of the wells.
- Step 2 Perform ANOVA statistical assessments on groundwater quality data for each constituent identified in Step 1, comparing down gradient to up gradient wells.

- Step 3 Identify constituents with higher down gradient concentrations than upgradient for data sets identified as ANOVA significant in Step 2.
- Step 4 Identify constituents of concern, i.e., those identified in Step 3 with concentrations higher than the Groundwater Protection Standards.
- Step 5 Perform confidence interval analyses on constituents of concern identified in Step 4.

The following sections of the report provide information on the analytical results for each well, a discussion of the statistical evaluation of the analytical results and conclusions and recommendations based on the analytical test results, statistical evaluation and constituents of concern assessment.

2.0 MONITORING WELL SUMMARIES

2.1 MONITORING WELL TJMW-2

Monitoring Well TJMW-2 is completed to a depth of 455 feet below ground surface (Elevation 4814.16) and was drilled and installed in January 1995. The well serves the TJL as the site up gradient well.

Summary of Analytical Results for 2002 sampling period

One groundwater-sampling round was completed for this well in 2002. This sampling round was performed on March 5, 2002 and constituted the 34th round for this particular well.

Several constituents have historically had concentrations higher than the groundwater protection standards presented on the list of Constituents for Detection Monitoring (Table R315-308-4 in The Manual for Solid Waste Permitting and Management Rules R315-301 through 320, Utah Administrative Code). That trend continues and many of the constituents remain consistent with historical values. However, Arsenic, which measured slightly above the standard (0.05 mg/l) on one occasion in 2000 and did not measure above the standard in 2001 was non-detectable (<0.005 mg/l) in 2002. Also, for the first time, a hit of Tetrachloroethylene (Tetrachloroethene) was obtained. A concentration of 0.0036 mg/l was detected, which is below the groundwater protection standard of 0.005 mg/l.

The list of constituents having measured concentrations at or above the groundwater protection standards for Well TJMW-2 in the single 2002 sampling round are listed in the following table:

Well TJMW-2 (continued on the next page)

Constituent	Groundwater Protection Standard (mg/l)	Sampling Round 34 (mg/l)
Beryllium	0.004	0.086
Cadmium	0.005	0.390
Cobalt	2.0	3.6
Copper	1.3	21.0

Constituent	Groundwater Protection Standard (mg/l)	Sampling Round 34 (mg/l)
Lead	0.015	0.024
Nickel	0.1	5.4
Thallium	0.002	0.0056
Zinc	5.0	31.0

2.2 MONITORING WELL TJMW-3

Monitoring well TJMW-3 is completed to a depth of 319 feet below ground surface (Elevation 4710.77) and was drilled and installed in December of 1995 as a down gradient well.

Summary of Analytical Results for 2002 sampling period

Due to the lack of water in well TJMW-3, analytical testing could not be conducted. However, just enough water was present to obtain a water level reading. The groundwater levels are shown in The Field Data Sampling Summary Sheet in Appendix D.

As a summary for well TJMW-3, during the 2001 analytical results three of the heavy metals analyzed were above the groundwater protection standard. It should be noted that throughout the well's history, as many as 15 constituents have been above the reporting limits. Several of these constituent levels dropped below the standards over time and an overall trend of these constituents reducing with time was apparent.

2.3 MONITORING WELL TJMW-4

Monitoring well TJMW-4 is completed to a depth of 365 feet below ground surface and was drilled and installed in November of 1997 as a down gradient well.

Summary of Analytical Results for 2002 sampling period

Four groundwater-sampling rounds were completed for this well in 2002. Dates for the sampling rounds are summarized in Table 1. These sampling rounds constitute the 16th, 17th 18th and 19th rounds for this particular well.

Based on the results of the 2002 chemical analysis, two of the heavy metals analyzed were above the groundwater protection standards, Lead and Thallium. In general, Lead was lower than previous years but still exceeded the standards. Thallium was just slightly above this standard with one reading of 0.0021 mg/l in March of 2002, while the other rounds were all non-detect (<0.001 mg/l). Arsenic, Chromium and Nickel, which were above the groundwater protection standards in 2001, did not exceed the standards in 2002.

No organic constituents were observed above the groundwater protection standards in Well TJMW-4.

The list of constituents having measured concentrations at or above the groundwater protection standards for Well TJMW-4 in the 2002 sampling rounds are listed in the following table:

Well TJMW-4

Constituent	stituent Groundwater Protection Standard (mg/l)		Sampling Round 17 (mg/l)	Sampling Round 18 (mg/l)	Sampling Round 19 (mg/l)	
Lead	0.015	0.061	0.065	0.044	0.033	
Thallium	0.002	0.0021	<0.001	<0.001	< 0.001	

2.4 MONITORING WELL TJMW-5

Monitoring well TJMW-5 is completed to a depth of 365 feet below ground surface (Elevation 4705.9) and was drilled and installed in July of 1998 as a down gradient well.

Summary of Analytical Results for 2002 sampling period

Four groundwater-sampling rounds were completed for this well in 2002. Dates for the sampling rounds are summarized in Table 1. These sampling rounds constitute the 16th, 17th, 18th and 19th rounds for this particular well.

Based on the results of the 2002 chemical analysis, two of the heavy metals are above the groundwater protection standards, Lead and Thallium. In general, Lead was lower than previous years but still exceeded the standards. Thallium was just slightly above the

standard (0.002 mg/l) with one reading of 0.0021 mg/l in March of 2002, while the other rounds were lower than groundwater protection standards or non-detect (<0.001 mg/l). Arsenic, which measured above the standard in 2001, measured below the standard in 2002.

Of the organic constituents analyzed, Tetrachloroethene continued to be above the groundwater protection standard in Well TJMW-5 and has generally increased from historical values. Also, 1,1,1-Trichloroethane, even though it is below the groundwater protection standard, has also shown an increase over time.

The list of constituents having measured concentrations at or above the groundwater protection standards for Well TJMW-5 in the 2002 sampling rounds are listed in the following table:

Well TJMW-5

Constituent	Groundwater Protection Standard (mg/l)	Sampling Round 16 (mg/l)	Sampling Round 17 (mg/l)	Sampling Round 18 (mg/l)	Sampling Round 19 (mg/l)	
Lead	0.015	0.10	0.045	0.087	0.022	
Thallium	0.002	0.0021	<0.001	0.0017	< 0.001	
Tetrachloroethene	0.005	0.016	0.011	0.015	0.014	

3.0 STATISTICAL EVALUATION OF ANALYTICAL RESULTS

The statistical analysis was performed on all constituents returning a measurable concentration in any of the 2002 sampling rounds. Statistical analyses recommended by the EPA (1989, 1992) were performed on groundwater quality data for monitoring wells TJMW-2 (background) TJMW-3, TJMW-4 and TJMW-5 (down gradient). Further statistical analysis of Tetrachloroethene concentrations observed in well TJMW-5 was performed since it was reported above the groundwater protection standards and was not observed in the up gradient well at similar concentrations.

The "Sanitas" software package was used to perform the statistical assessment of the data. Sanitas is a statistical package that follows the EPA process and performs the type of analysis allowed. A flowchart depicting the steps used in the statistical analyses is presented as Plate 1 of Appendix A.

Generally, the analysis completed for the constituents was an interwell Parametric Analysis of Variance (ANOVA). Where the data for a particular constituent had greater than 15% non-detects, a non-parametric ANOVA was completed.

Several cases were encountered where outliers in the data were encountered. Removal of these points would change the data from a non-normal or non-log normal distribution to a normal or log normal distribution. This type of distribution is more appropriate for a statistical assessment. However, EPA recommends that where sufficient reason for removal of the outliers is not available, the data should be kept in the assessment. Since there was no evidence to support the removal of collected data, none of the identified outlier data was removed from the statistical assessment.

Several constituents had results that were ANOVA significant, indicating that the down gradient wells had a statistically different distribution than the up gradient well. A summary table presenting the ANOVA significant results of all constituents with measurable concentrations is presented in Appendix A. Time series graphs for all constituents in this summary table are presented in Appendix B of this report. A review of the data for the constituents listed was completed to identify any unusual characteristics and any suspicious data was checked against the original records.

To continue progressing towards identifying constituents of concern, the time series graphs in Appendix B were also used to compare concentrations in the down gradient wells to the up gradient well for those constituents identified as being ANOVA significant. The following ANOVA significant constituents were identified as having higher measured concentrations down gradient than up gradient in the 2002 sampling rounds:

- Nitrate
- Bicarbonate
- Calcium
- Potassium
- Arsenic
- Barium
- 1,1 Dichloroethene
- Tetrachloroethene
- 1,1,1 Trichloroethane
- Trichloroflouromethane
- Dichlorodiflouromethane

To define the constituents of concern, the constituents listed above were compared to the groundwater protection standards. Only Tetrachloroethene in TJMW-5 was above the groundwater protection standards and was identified as a constituent of concern.

Confidence intervals were performed on this constituent over the last 10 sampling rounds. Based on the Non-Parametric Confidence Interval analysis, the compliance limit of 0.005 mg/l for Tetrachloroethene was not exceeded. The results of this analysis are included in Appendix C.

4.0 GROUNDWATER ELEVATIONS

Groundwater elevations in the four monitoring wells have been decreasing over the past few years. As noted previously, wells TJMW-2 and TJMW-3 have dried up to the point that analytical samples can no longer be taken. Also mentioned previously, it is suspected that an up gradient groundwater cutoff wall completed by Kennecott Utah Corporation (KUC), several years of below average precipitation, and down gradient water usage all have contributed to the drop in water levels.

It should also be noted that Kennecott will begin an extensive groundwater recovery/remediation program immediately adjacent to the Trans Jordan site. This process will have an even greater impact to the groundwater elevations and direction of flow at the site. As the impacts from the Kennecott project become evident, modifications to the Trans Jordan groundwater monitoring program will be necessary.

A summary of the change in groundwater elevation and water column height in the wells are provided below:

Summary of Groundwater Elevations and Water Column Heights

Well Identification	Initial GW Elevation	Initial Height of Water Column	Dec. 2002 GW Elevation	Dec. 2002 Height of Water Column		
TJMW-1	4852.96	38.80	4828.32	14.16		
TJMW-2	4747.27	34.50	4712.82	DRY		
TJMW-3	4741.04	30.27	4710.09	DRY		
TJMW-4	4728.28	21.85	4710.59	4.16		
TJMW-5	4727.09	21.19	4710.44	4.54		

These new groundwater elevations for 2002 reflect a general decrease of over three feet from the past year with groundwater elevations in the wells having dropped between 17 and 34 feet since the initial well construction. As noted previously, these new groundwater elevations reflect a change in the direction of the groundwater flow from generally east to generally south, which impacts the up gradient/down gradient well status and ultimately the statistical analysis. Plots of the groundwater contours and complete records, including graphs, of the groundwater elevations over time in all the wells are included in Appendix D.

5.0 CONCLUSIONS AND RECOMMENDATIONS

In general, organic constituents that have been a concern in the past appear to be decreasing in concentration with time with the exception being Tetrachloroethene. Tetrachloroethene continues to be measured in concentrations above groundwater protection standards in well TJMW-5 and has trended slightly higher in recent years.

Based on a confidence interval analysis of the ten most recent measured concentrations of Tetrachloroethene in well TJMW-5, concentrations currently do not exceed the groundwater protection standard of 0.005 mg/l. However, based on our projections, it is likely the confidence interval for Tetrachloroethene in well TJMW-5 will be exceeded with the next sampling round.

As discussed, Lead and Thallium are metals that have measurable concentrations above groundwater protection standards in the down gradient wells. However, measured concentrations of these metals and others are consistently higher in the up gradient well or are not ANOVA significant and therefore are not considered to be caused by TJL.

Nitrate, Bicarbonate, Calcium, Potassium, 1,1 Dichloroethene, 1,1,1 Trichloroethane, Trichlorofluoromethane and Dichlorodiflouromethane were observed to have higher measured concentrations down gradient than up gradient but either they did not exceed the groundwater protection standards or are not currently regulated under the groundwater protection standards.

The Sampling and Analysis Plan has not been finalized due to the dropping water levels and their impact to the groundwater monitoring system.

6.0 LIMITATIONS

The recommendations contained in this report are based, in part, on historical sampling data that was performed by others and on ongoing data collected by IGES. IGES assumes no liability as to the accuracy of the historical data used in this assessment.

This report was prepared in accordance with the generally accepted standard of practice at the time this report was written. No warranty, expressed or implied, is made.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding this report, please do not hesitate to contact us at your convenience (801) 521-1800.

Respectfully submitted,

IGES, Inc.

Kent A Hartley P.F.

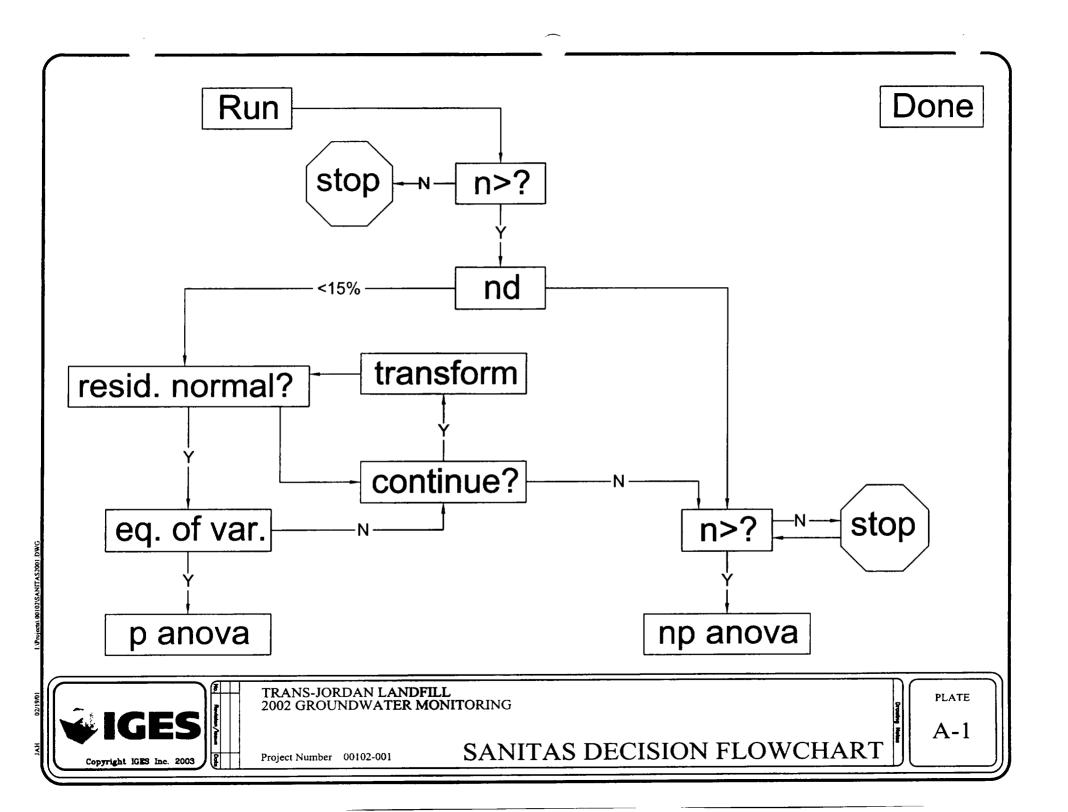
Associate

Brett D. Mickelson, P.E.

Principal

Appendix A

(2002 Groundwater Monitoring Report)



Analysis of Variance Summary

Date: 2/20/03, 4:22 PM

8.01 For the statistical analyses of groundwater by IGES only.

Facility: Trans-Jordan-Cities/

Data File: 2002gw

Client: IGES

Constituent	CAS#	<u>Well</u>	Calculated	Critical	Signif.	Alpha	Bg Wells	Transform	ANOVA Sig.	<u>Alpha</u>	Method	
Ammonia (mg/l)	7664-41-7	MW-3	-33.006	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)	
Ammonia (mg/l)	7664-41-7	MW-4	-36.433	15.498	No	0.01667	MW-2	D/ a	Yes	0.05	NP (non-detects)	
Ammonia (mg/l)	7664-41-7	MW-5	-33.960	15.498	No	0.01667	MW-2	11/2	Yes	0.05	NP (non-detects)	
Nitrate (mg/l)	n/a	MW-3	42.976	15.126	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)	
Nitrate (mg/l)	n/a	MW-4	49.187	15.395	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)	
Nitrate (mg/l)	n/a	MW-5	24.837	15.126	Yes	0.01667	MW-2	D/S	Yes	0.05	NP (non-detects)	
Bicarbonate (mg/l)	n/2	MW-3	40.605	15.247	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)	
Bicarbonate (mg/l)	D/2	MW-4	23.944	15.498	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)	
Bicarbonate (mg/l)	D/B	MW-5	60.000	15.496	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)	
pH (pH-units)	n/a	MW-3	45.684	15.247	Yes	0.01667	MW-2	11/2	Yes	0.05	NP (equality of variance)	
pH (pH-units)	n/a	MW-4	45.583	15.498	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (equality of variance)	
pH (pH-units)	n/a	MW-5	33.000	15.498	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (equality of variance)	
Calcium (mg/l)	n/a	MW-3	2.47	0.571	Yes	0.01667	MW-2	square root(x)	Yes	0.05	Parametric	
Calcium (mg/l)	n/a	MW-4	1.25	0.581	Yes	0.01667	MW-2	square root(x)	Yes	0.05	Parametric	
Calcium (mg/l)	n/a	MW-5	4.79	0.581	Yes	0.01667	MW-2	square root(x)	Yes	0.05	Parametric	
Potassium (mg/l)	n/a	MW-3	2.785	15.247	No	0.01667	MW-2	0/2	Yes	0.05	NP (normality)	
Potassium (mg/l)	n/a	MW-4	14.788	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)	
Potassium (mg/l)	n/a	MW-5	36.371	15.498	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (normality)	
Chloride (mg/l)	п/а	MW-3	-40.075	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)	
Chloride (mg/l)	п/а	MW-4	-28.786	15.498	No	0.01667	MW-2	11/2	Yes	0.05	NP (normality)	
Chloride (mg/l)	D/A	MW-5	-15.536	15.498	No	0.01667	MW-2	D/a	Yes	0.05	NP (normality)	
Sodium (mg/l)	n/a	MW-3	6.344	15.247	No	0.01667	MW-2	n/a	No	0.05	NP (normality)	
Sodium (mg/l)	n/a	MW-4	-3.810	15.498	No	0.01667	MW-2	n/a	No	0.05	NP (normality)	
Sodium (mg/l)	n/a	MW-5	-2.393	15.498	No	0.01667	MW-2	n/a	No	0.05	NP (normality)	
Iron (mg/l)	7439 -8 9-6	MW-3	-2.33	1.43	No	0.01667	MW-2	square root(x)	Yes	0.05	Parametric	
Iron (mg/l)	7439-89-6	MW-4	-1.27	1.46	No	0.01667	MW-2	square root(x)	Yes	0.05	Parametric	
Iron (mg/l)	7439-89-6	MW-5	-2.31	1.46	No	0.01667	MW-2	square root(x)	Yes	0.05	Parametric	
Sulfate (mg/l)	D/\$	MW-3	-39.737	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)	
Sulfate (mg/l)	n/a	MW-4	-56.694	15.498	No	0.01667	MW-2	n/a	Yes -	0.05	NP (normality)	
Sulfate (mg/l)	n/a	MW-5	-28.167	15.498	No	0.01667	MW-2	o/a	Yes	0.05	NP (normality)	
Magnesium (mg/l)	n/a	MW-3	-45.474	15.247	No	0.01667	MW-2	0/8	Yes	0.05	NP (normality)	
Magnesium (mg/l)	n/a	MW-4	-54.444	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)	
Magnesium (mg/I)	n/a	MW-5	-24.361	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)	
TDS (mg/l)	п/2	MW-3	-46.237	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)	
TDS (mg/l)	п/а	MW-4	-51.417	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)	
TDS (mg/l)	n/a	MW-5	-26.583	15,498	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)	
Manganese (mg/l)	7439-96-5	MW-3	-42.132	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (normslity)	

Analysis of Varience Summary

Date: 2/20/03, 4:22 PM

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Facility: Trans-Jordan-Cities/

Data File: 2002gw

Client: IGES

Constituent	CAS#	<u>Well</u>	Calculated	Critical	Signif.	Alpha	Bg Wells	Transform	ANOVA Sig.	<u>Alpha</u>	Method
Manganese (mg/l)	7439-96-5	MW-4	-40.583	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Manganese (mg/l)	7439-96-5	MW-5	-37.139	15.496	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
TOC (mg/l)	n/a	MW-3	-1.667	15.049	No	0.01667	MW-2	n/a	No	0.05	NP (non-detects)
TOC (mg/l)	D/a	MW-4	0.667	15.049	No	0.01667	MW-2	n/a	No	0.05	NP (non-detects)
TOC (mg/l)	n/a	MW-5	12.039	15.312	No	0.01667	MW-2	D/a	No	0.05	NP (non-detects)
Arsenic (mg/l)	7440-38-2	MW-3	13.133	15.575	No	0.01667	MW-2	D/a	Yes	0.05	NP (non-detects)
Arsenic (mg/l)	7440-38-2	MW-4	24.293	16.719	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Arsenic (mg/l)	7440-38-2	MW-5	11.285	17.011	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Barium (mg/l)	7440-39-3	MW-3	0.138	0.157	No	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Barium (mg/l)	7440-39-3	MW-4	0.263	0.16	Yes	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Barium (mg/l)	7440-39-3	MW-5	0.109	0.16	No	0.01667	MW-2	square root(x)	Yes	0.05	Parametric
Beryllium (mg/l)	7440-41-7	MW-3	-45.854	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Beryllium (mg/l)	7440-41-7	MW-4	-42.658	16.719	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Beryllium (mg/l)	7440-41-7	MW-5	-53.111	17.011	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Cadmium (mg/l)	7440-43-9	MW-3	-45.542	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Cadmium (mg/l)	7440-43-9	MW-4	-49.921	16.719	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Cadmium (mg/l)	7440-43-9	MW-5	-45.861	17.011	No	0.01667	MW-2	D/a	Yes	0.05	NP (non-detects)
Chromium (mg/l)	n/a	MW-3	-12.165	15.575	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Chromium (mg/l)	п/а	MW-4	-4.447	16.719	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Chromium (mg/l)	n/a	MW-5	-17.699	17.011	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Cobalt (mg/l)	7440-48-4	MW-3	-44.816	15.247	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Cobalt (mg/l)	7440-48-4	MW-4	-40.556	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Cobalt (mg/l)	7440-48-4	MW-5	-38.944	15.498	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Copper (mg/l)	7440-50-8	MW-3	-48.208	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (equality of variance)
Copper (mg/l)	7440-50-8	MW-4	-41.553	16.719	.No	0.01667	MW-2	n/a	Yes	0.05	NP (equality of variance)
Copper (mg/l)	7440-50-8	MW-5	-51.139	17.011	No	0.01667	MW-2	n/a	Yes	0.05	NP (equality of variance)
Lead (mg/l)	n/a	MW-3	-1.273	15.575	No	0.01667	MW-2	n/a	No	0.05	NP (equality of variance)
Lead (mg/l)	n/a	MW-4	1.113	16.719	No	0.01667	MW-2	n/a	No	0.05	NP (equality of variance)
Lead (mg/l)	n/a	MW-5	-17.439	17.011	No	0.01667	MW-2	D/a	No	0.05	NP (equality of variance)
Nickel (mg/l)	7440-02-0	MW-3	-41.750	15.410	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Nickel (mg/l)	7440-02-0	MW-4	-44.778	16.831	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Nickel (mg/l)	7440-02-0	MW-5	-54.556	16.831	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Silver (mg/l)	7440-22-4	MW-3	-15.172	15.575	No	0.01667	MW-2	11/2	Yes	0.05	NP (non-detects)
Silver (mg/l)	7440-22-4	MW-4	-17.371	16.719	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Silver (mg/l)	7440-22-4	MW-5	-17.929	17.011	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Thallium (mg/l)	n/2	MW-3	-19.951	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Thallium (mg/l)	n/a	MW-4	-34.181	16.719	No	0.01667	MW-2	n/2	Yes	0.05	NP (non-detects)

Analysis of Variance Summary

Date: 2/20/03, 4:22 PM

Facility: Trans-Jordan-Cities/

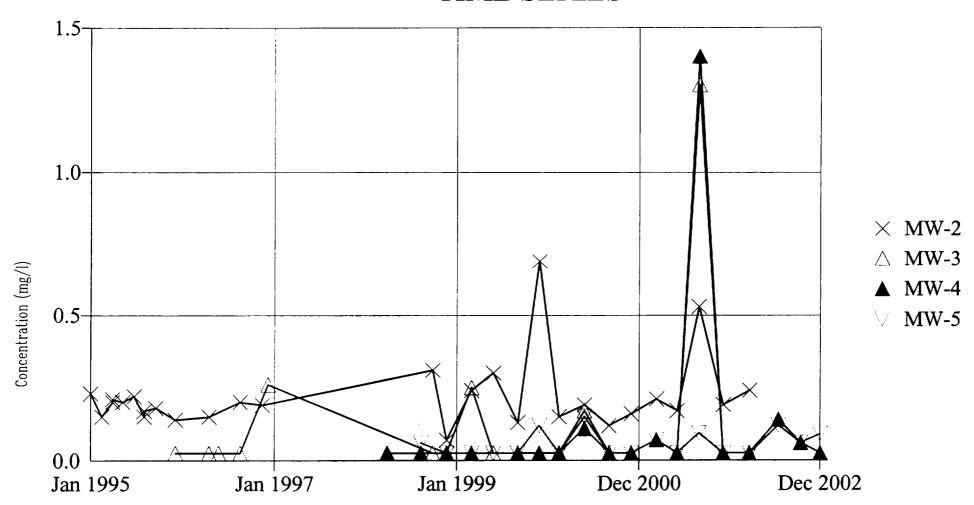
Data File: 2002gw

Client: IGES

Constituent	CAS#	<u>Well</u>	Calculated	Critical	Signif.	Alpha	Bg Wells	Transform	ANOVA Sig.	<u>Alpha</u>	Method
Thallium (mg/l)	n/a	MW-5	-42.159	17.011	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Vanadium (mg/I)	7440-62-2	MW-3	-15.852	15.247	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Vanadium (mg/l)	7440-62-2	MW-4	-10.450	15.498	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Vanadium (mg/l)	7440-62-2	MW-5	-17.034	15.498	No	0.01667	MW-2	n/a	No	0.05	NP (normality)
Zinc (mg/l)	7440-66-6	MW-3	-47.625	15.575	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Zinc (mg/l)	7440-66-6	MW-4	-44.605	16.719	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Zinc (mg/l)	7440-66-6	MW-5	-48.694	17.011	No	0.01667	MW-2	n/a	Yes	0.05	NP (normality)
Chloroethane (ug/l)	75-00-3	MW-3	-3.554	15.674	No	0.01667	MW-2	n/a	No	0.05	NP (non-detects)
Chloroethane (ug/l)	75-00-3	MW-4	-17.306	16.923	No	0.01667	MW-2	n/a	No	0.05	NP (non-detects)
Chloroethane (ug/l)	75-00-3	MW-5	-0.329	16.629	No	0.01667	MW-2	n/a	No	0.05	NP (non-detects)
1,1-Dichioroethene (ug/l)	75-35-4	MW-3	1.848	15.508	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
1,1-Dichloroethene (ug/l)	75-35-4	MW-4	0.000	16.744	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
1,1-Dichloroethene (ug/l)	75-35-4	MW-5	28.639	16.744	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Tetrachloroethene (ug/l)	127-18-4	MW-3	32.701	15.642	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Tetrachloroethene (ug/l)	127-18-4	MW-4	-1.132	17.102	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Tetrachioroethene (ug/l)	127-18-4	MW-5	46.604	16.805	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
1,1,1-Trichloroethane (ug/	71-55-6	MW-3	22.271	15.314	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
1,1,1-Trichloroethane (ug/	71-55-6	MW-4	2.063	17.415	No	0.01667	MW-2	r/a	Yes	0.05	NP (non-detects)
1,1,1-Trichloroethane (ug/	71-55-6	MW-5	50.895	16.453	Yes	0.01667	MW-2	11/2	Yes	0.05	NP (non-detects)
Trichlorofluoromethane (ug	75-69-4	MW-3	36.957	15.642	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Trichlorofluoromethane (ug	75-69-4	MW-4	-1.397	17.102	No	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)
Trichlorofluoromethane (ug	75-69-4	MW-5	10.156	16.805	No	0.01667	MW-2	0/2	Yes	0.05	NP (non-detects)
Dichlorodifluoromethane (u	75-71-8	MW-3	13.407	15.141	No	0.01667	MW-2	D/a	Yes	0.05	NP (non-detects)
Dichlorodifluoromethane (u	75-71-8	MW-4	-5.785	15.995	No	0.01667	MW-2	D/A	Yes	0.05	NP (non-detects)
Dichlorodifluoromethane (u	75-71-8	MW-5	22.810	15.753	Yes	0.01667	MW-2	n/a	Yes	0.05	NP (non-detects)

Appendix B

(2002 Groundwater Monitoring Report)



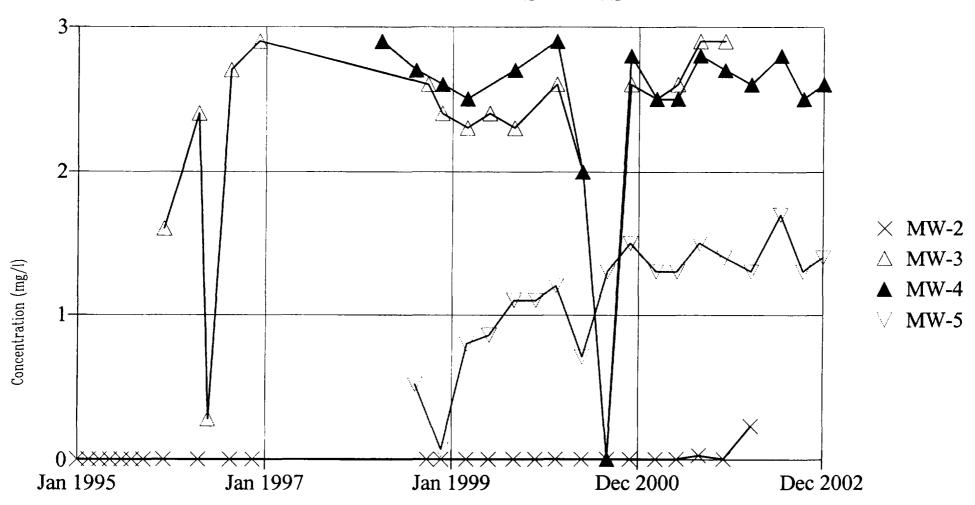
Constituent: Ammonia (mg/l)

Date: 2/20/03, 4:34 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Nitrate (mg/l)

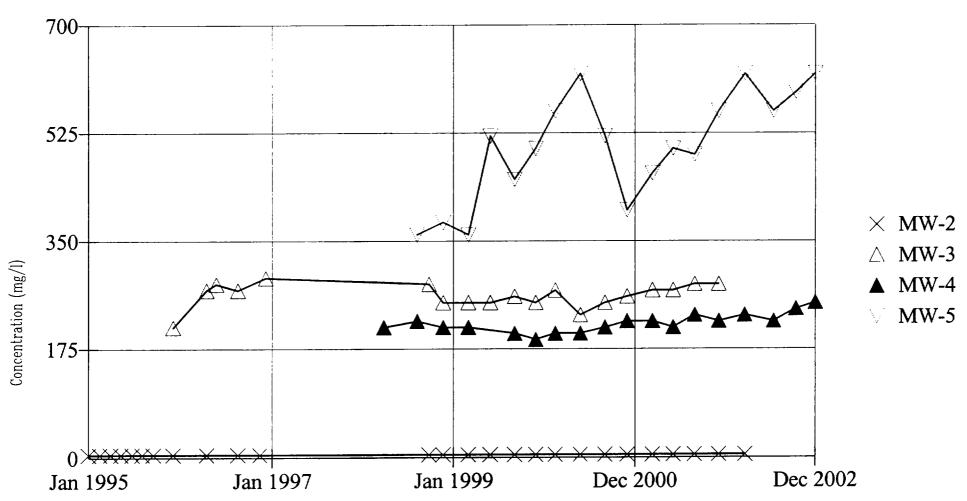
Date: 2/20/03, 4:36 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





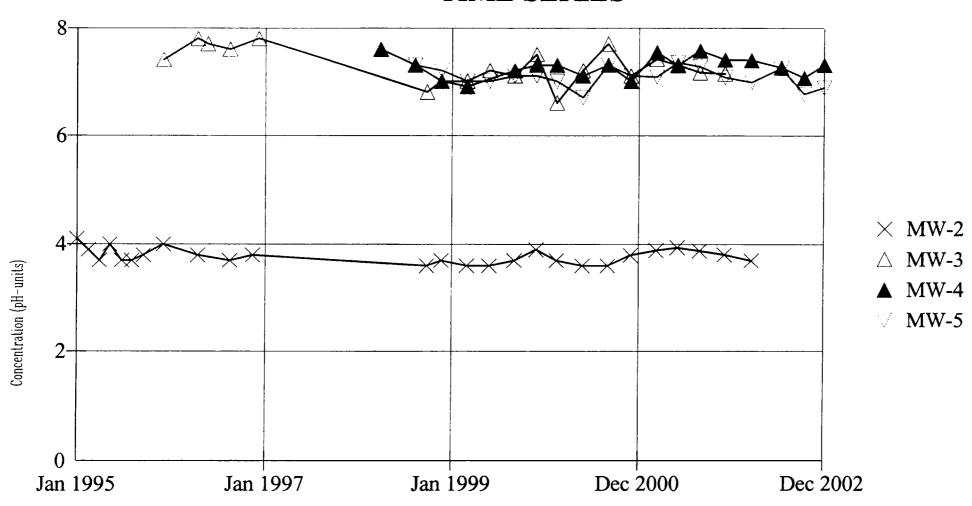
Constituent: Bicarbonate (mg/l)

Date: 2/20/03, 4:37 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



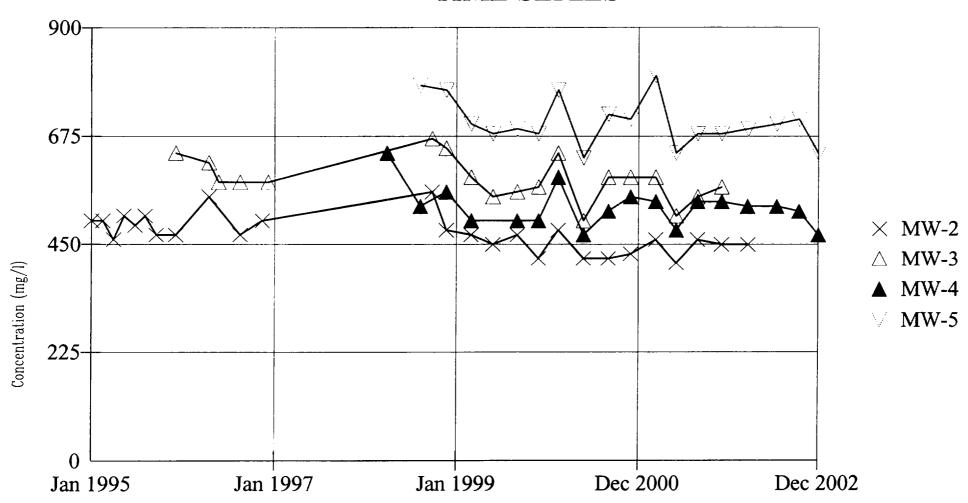
Constituent: pH (pH-units)

Date: 2/20/03, 4:38 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



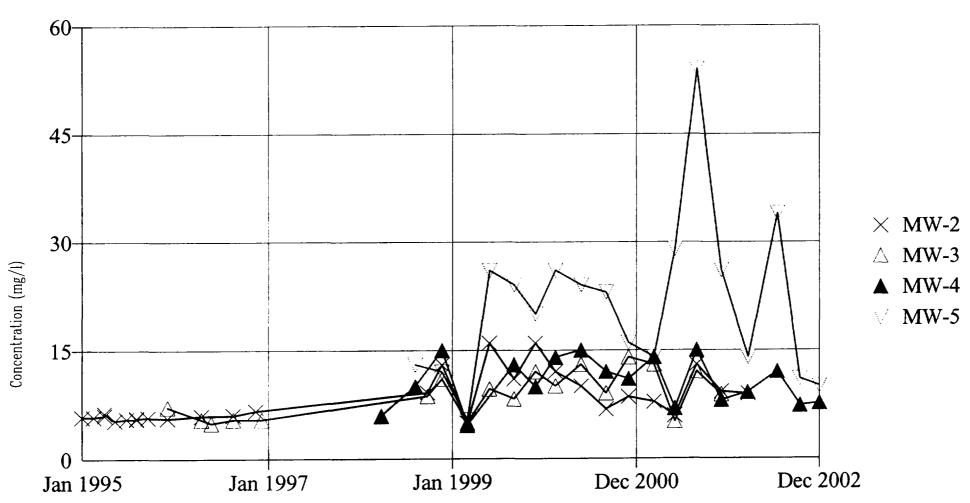
Constituent: Calcium (mg/l)

Date: 2/20/03, 4:39 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



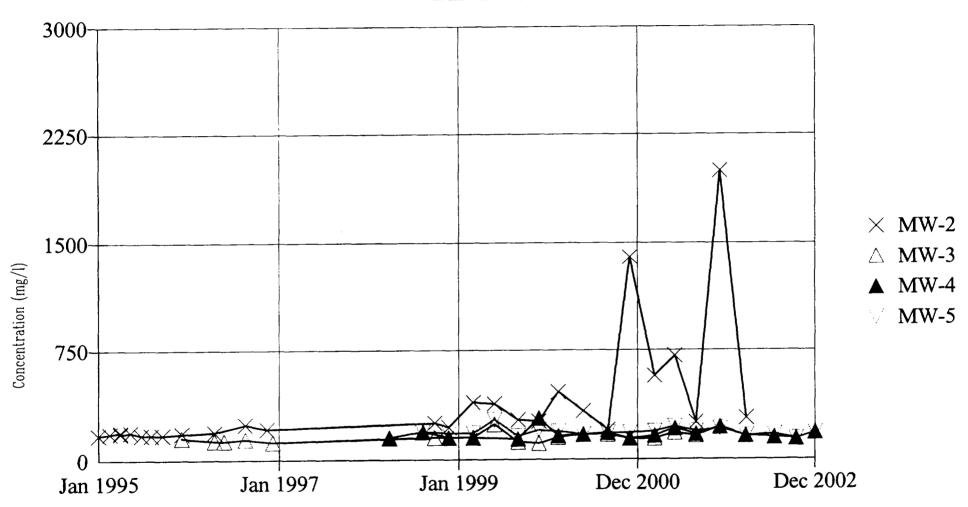
Constituent: Potassium (mg/l)

Date: 2/20/03, 4:40 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Chloride (mg/l)

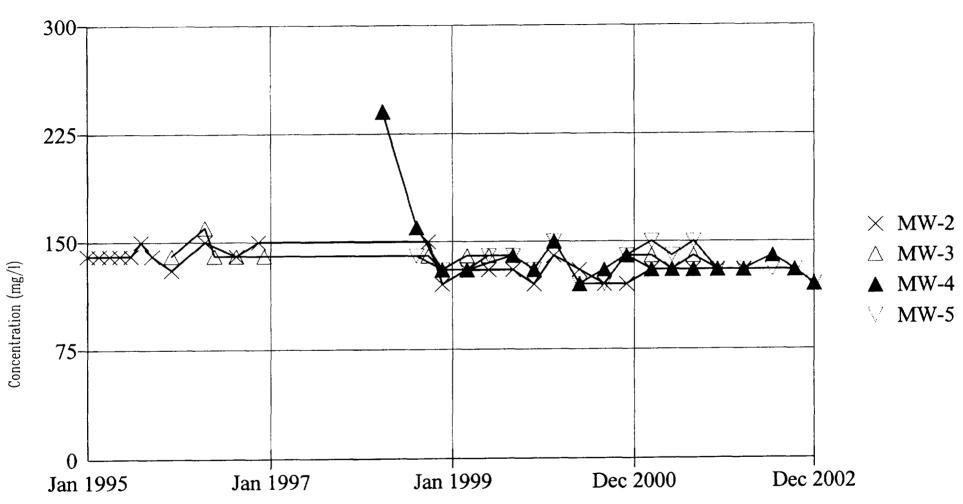
Date: 2/20/03, 4:42 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





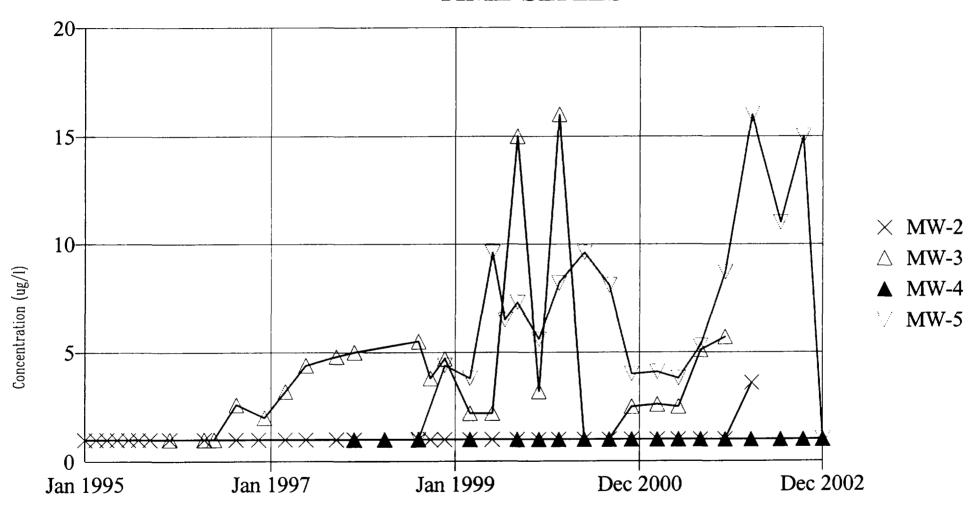
Constituent: Sodium (mg/l)

Date: 2/20/03, 4:43 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



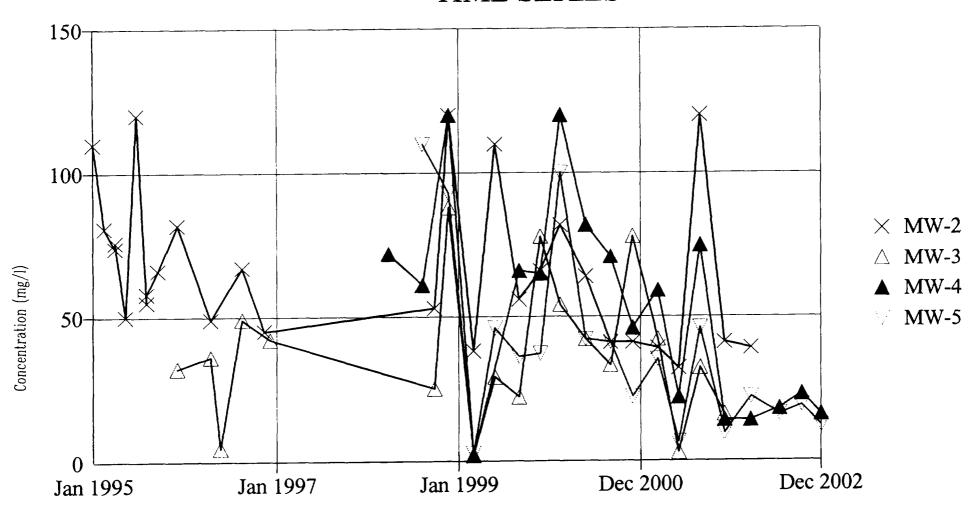
Constituent: Tetrachloroethene (ug/l)

Date: 2/20/03, 4:58 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Iron (mg/l)

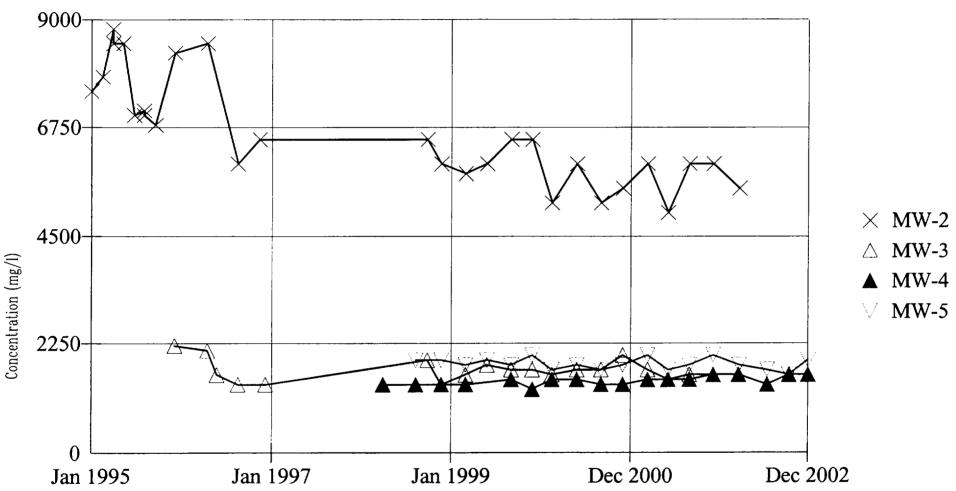
Date: 2/20/03, 4:43 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





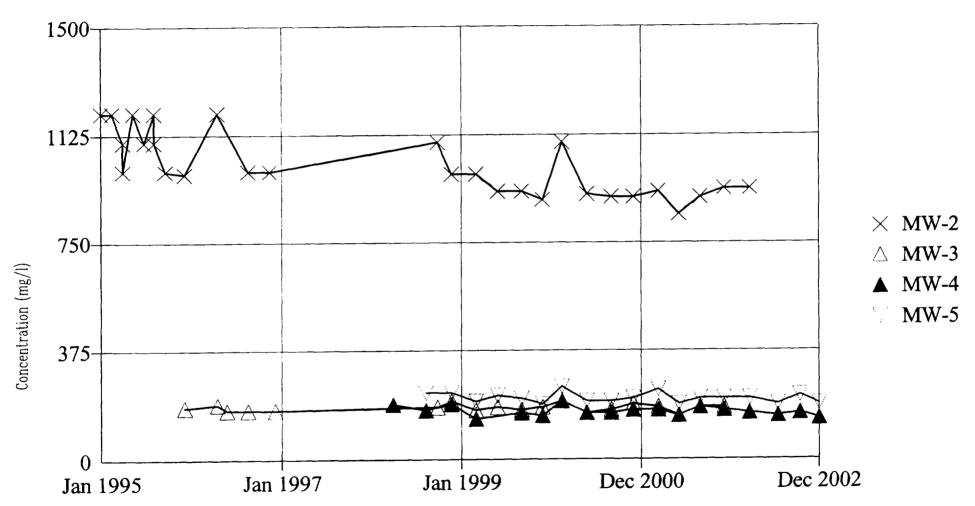
Constituent: Sulfate (mg/l)

Date: 2/20/03, 4:44 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Magnesium (mg/l)

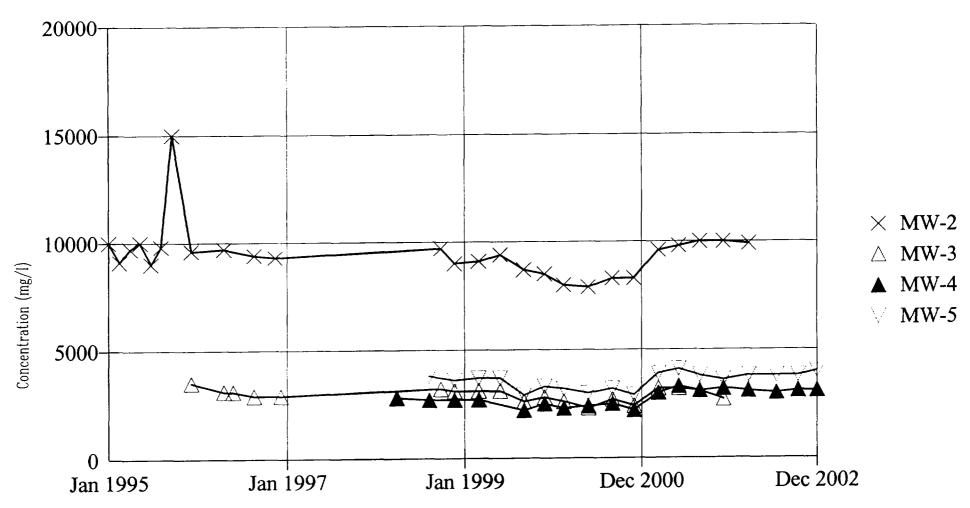
Date: 2/20/03, 4:44 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





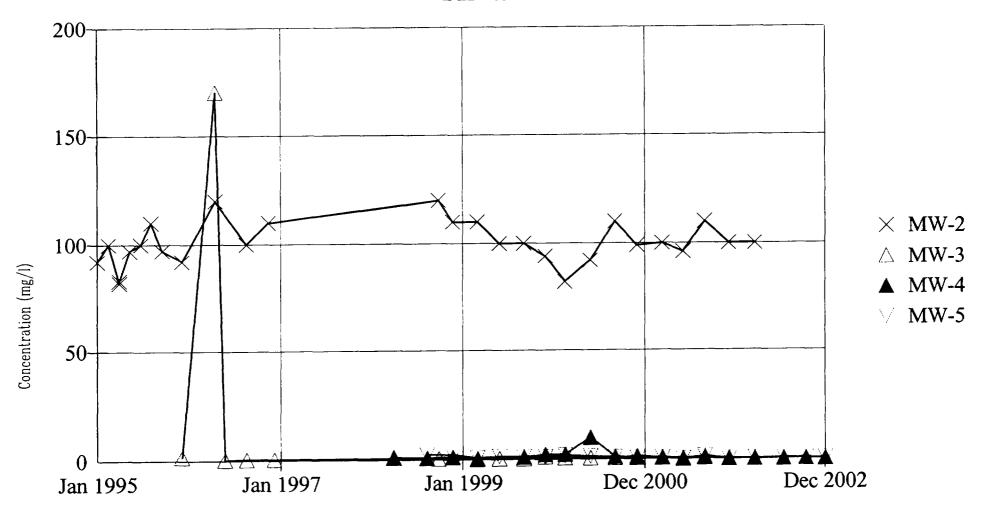
Constituent: TDS (mg/l)

Date: 2/20/03, 4:45 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



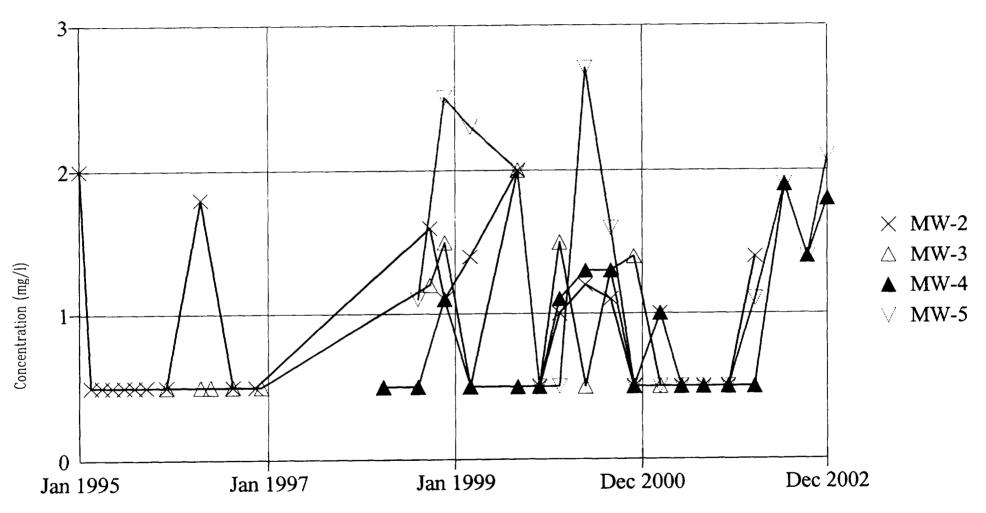
Constituent: Manganese (mg/l)

Date: 2/20/03, 4:46 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



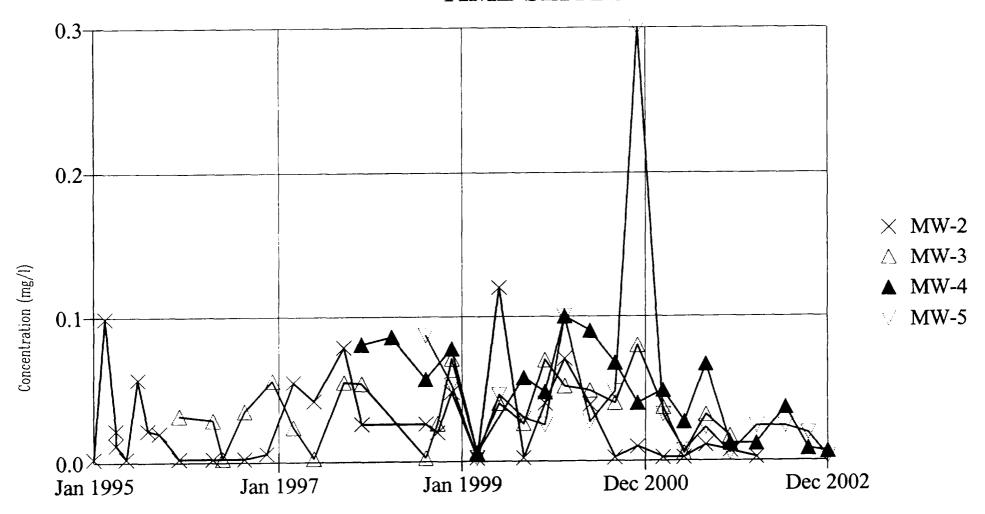
Constituent: TOC (mg/l)

Date: 2/20/03, 4:46 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



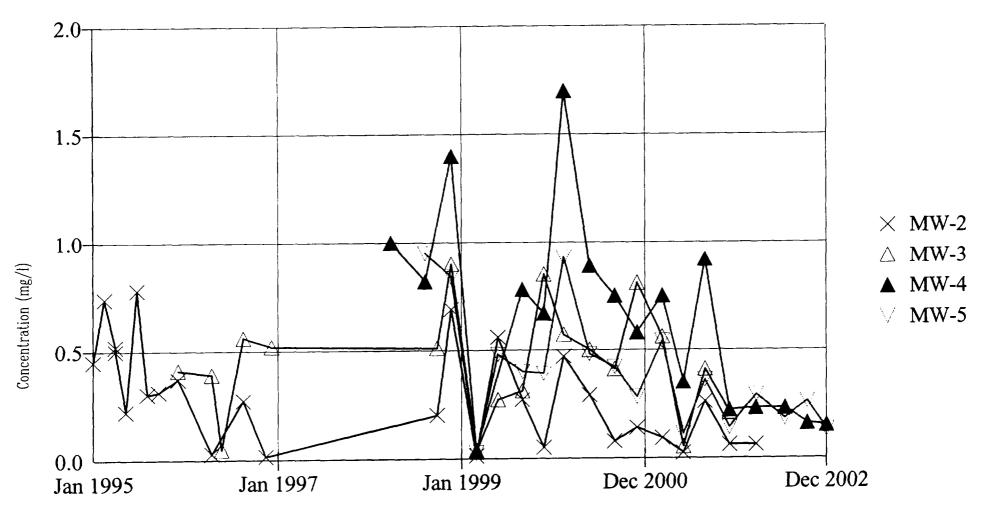
Constituent: Arsenic (mg/l)

Date: 2/20/03, 4:47 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Barium (mg/l)

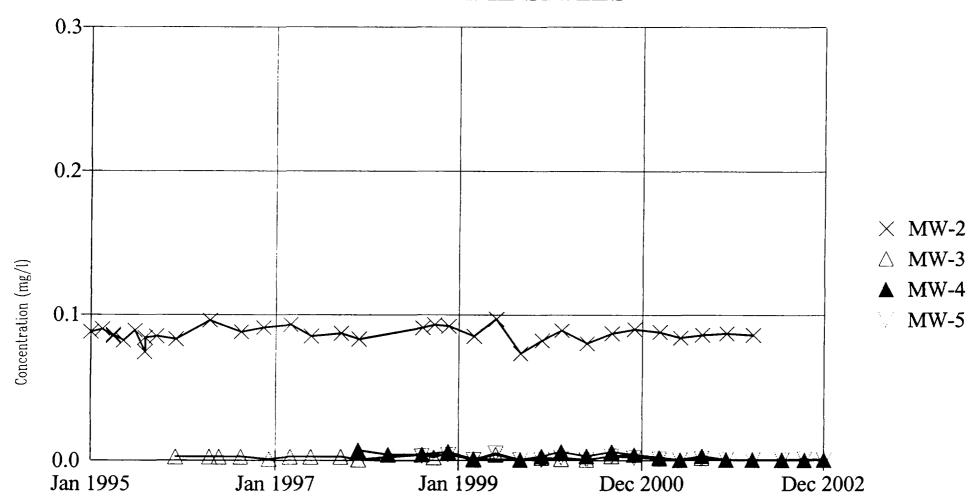
Date: 2/20/03, 4:48 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





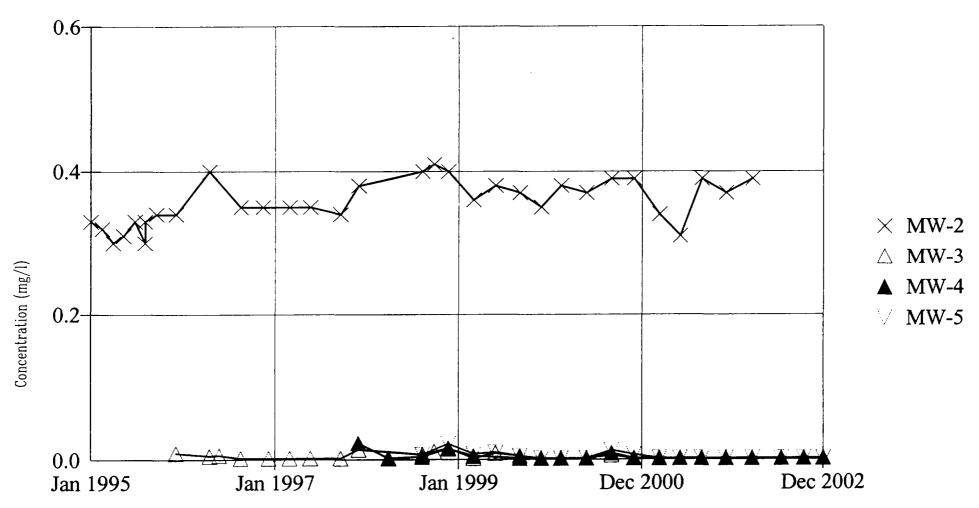
Constituent: Beryllium (mg/l)

Date: 2/20/03, 4:49 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



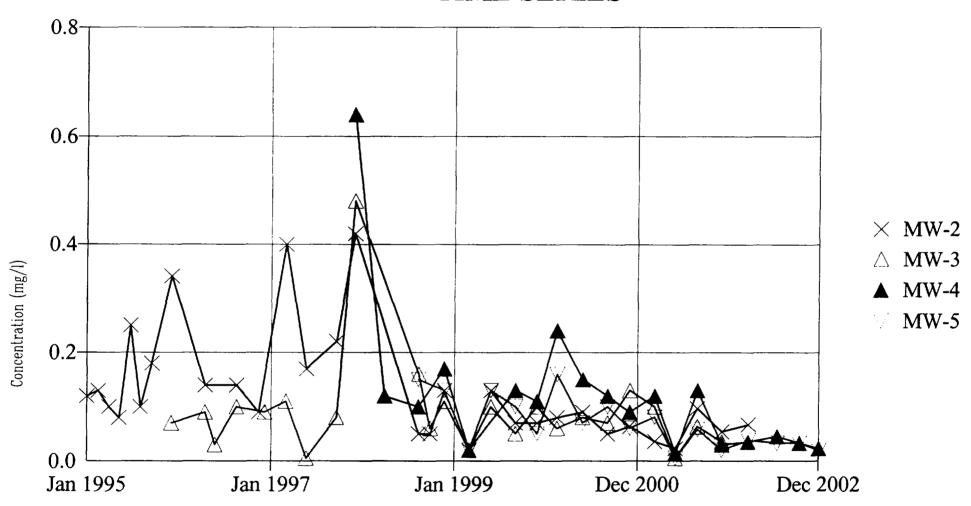
Constituent: Cadmium (mg/l)

Date: 2/20/03, 4:50 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Chromium (mg/l)

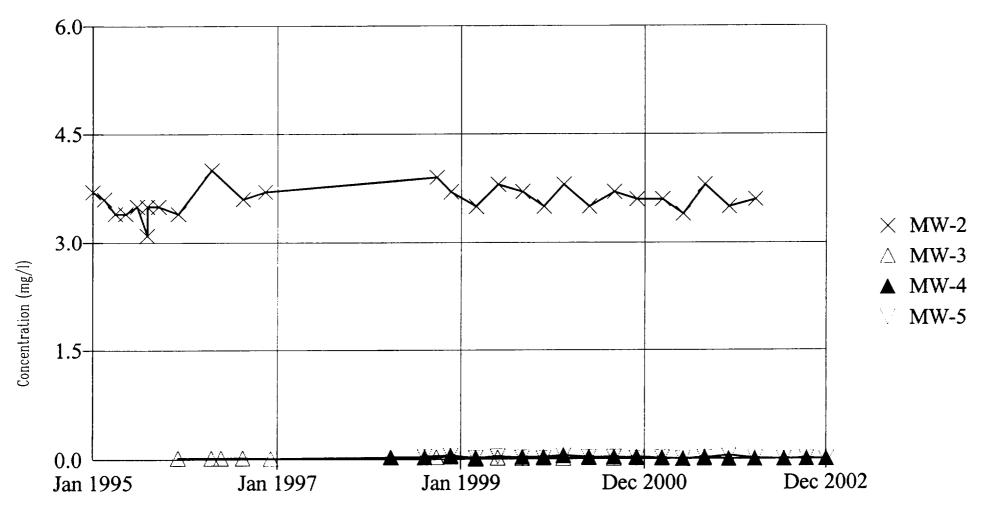
Date: 2/20/03, 4:51 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





Constituent: Cobalt (mg/l)

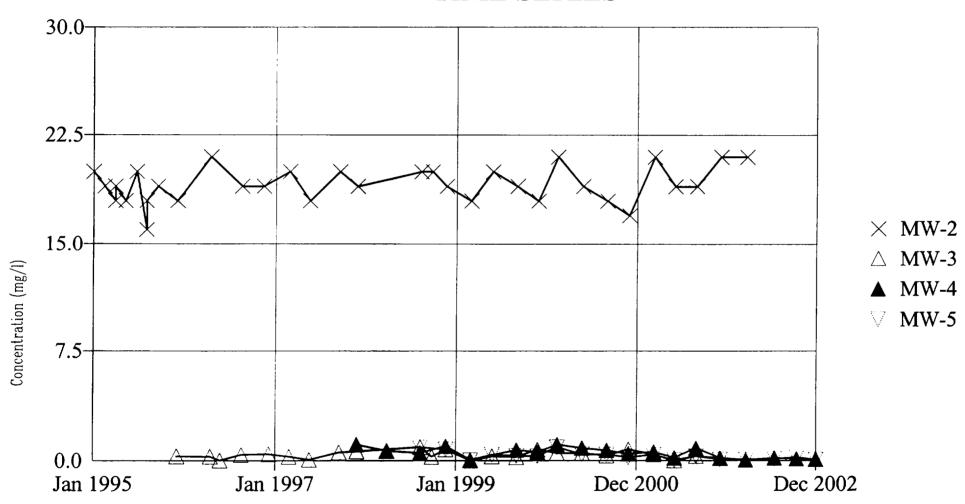
Date: 2/20/03, 4:51 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





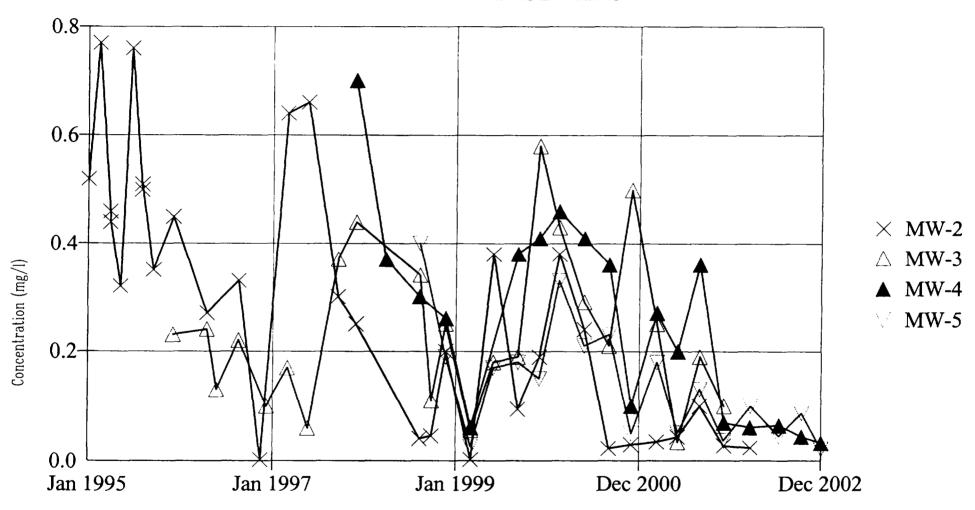
Constituent: Copper (mg/l)

Date: 2/20/03, 4:52 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



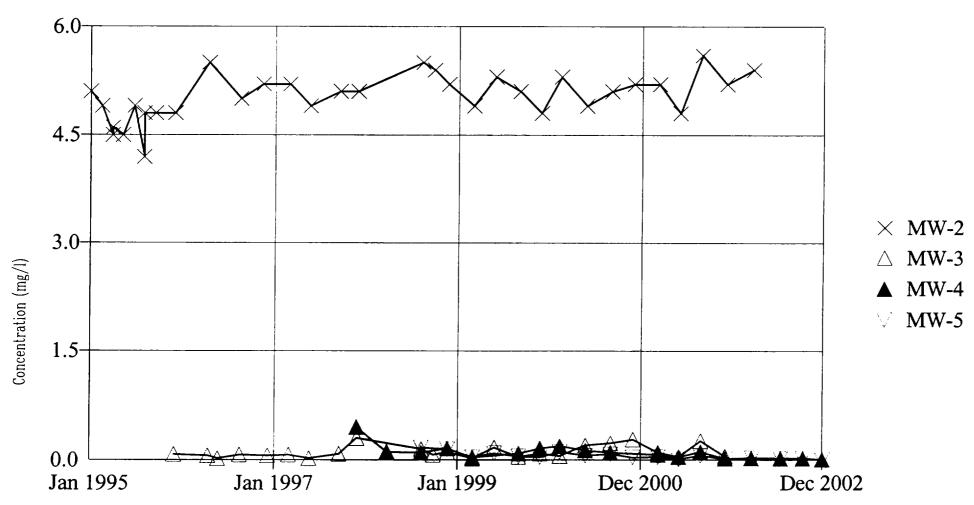
Constituent: Lead (mg/l)

Date: 2/20/03, 4:53 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



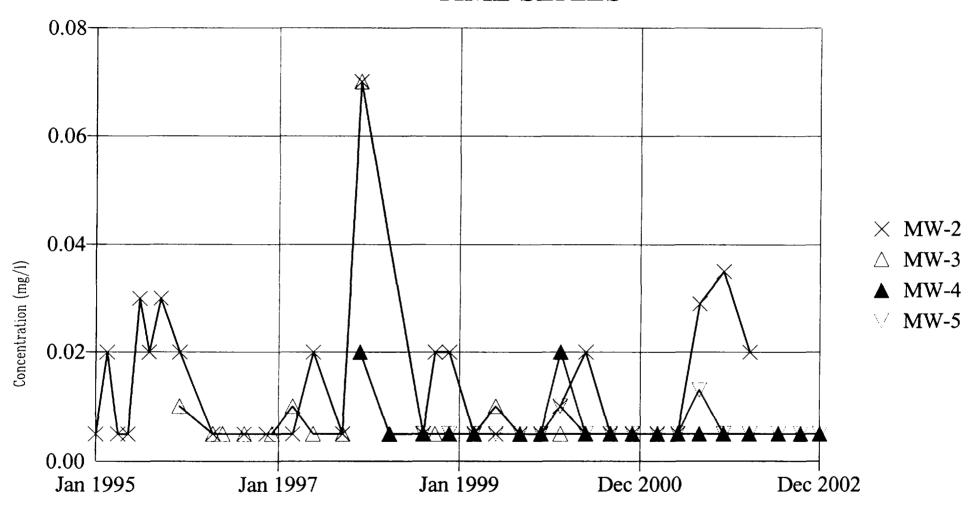
Constituent: Nickel (mg/l)

Date: 2/20/03, 4:53 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Silver (mg/l)

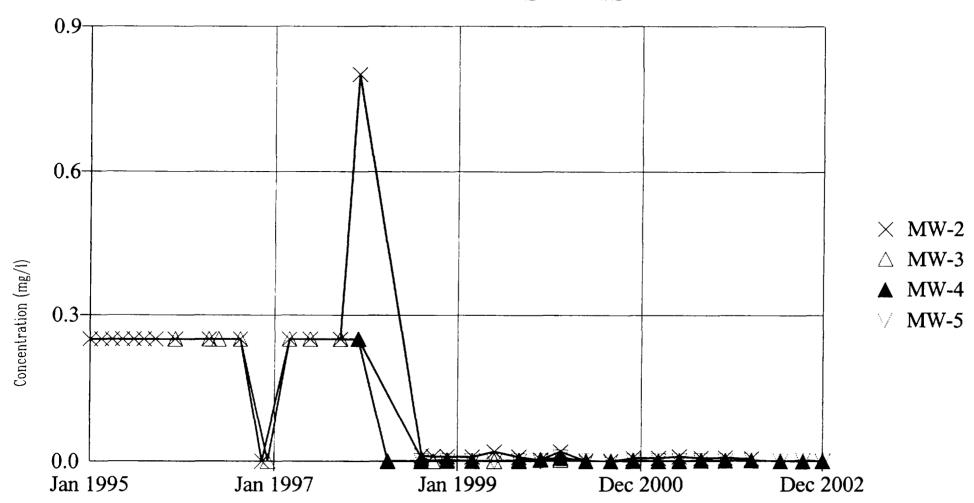
Date: 2/20/03, 4:54 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





Constituent: Thallium (mg/l)

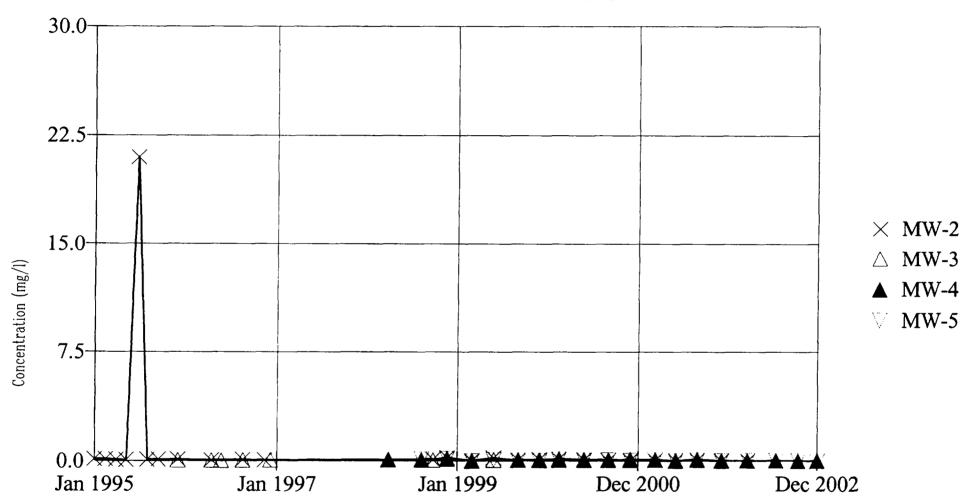
Date: 2/20/03, 4:54 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw





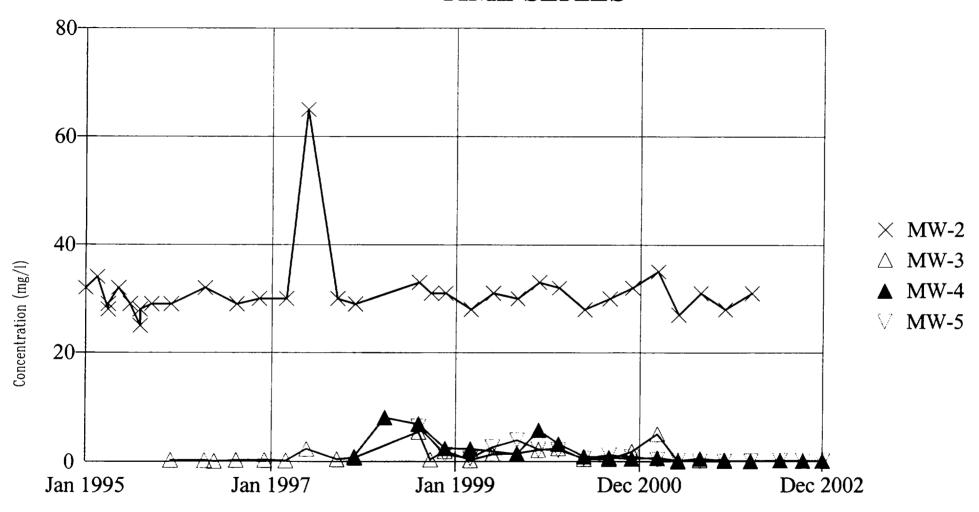
Constituent: Vanadium (mg/l)

Date: 2/20/03, 4:55 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



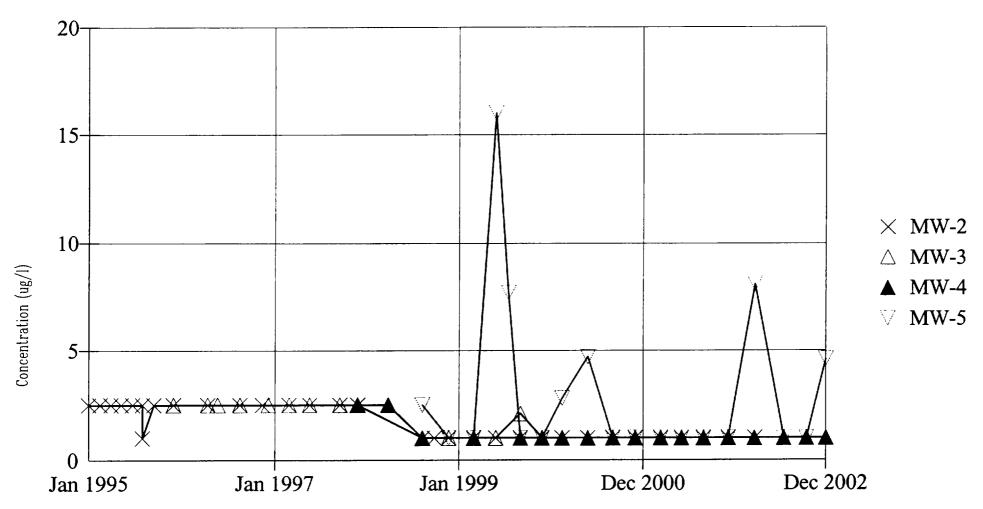
Constituent: Zinc (mg/l)

Date: 2/20/03, 4:56 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



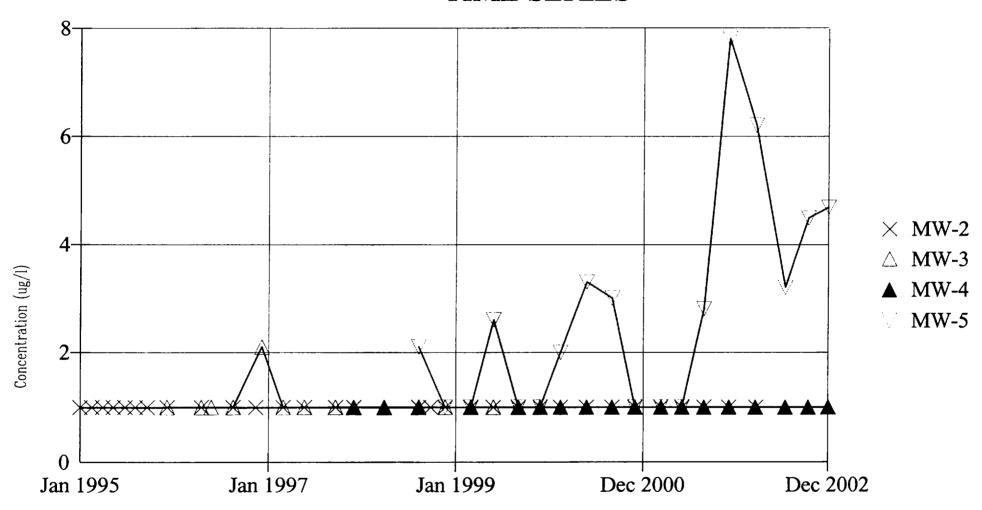
Constituent: Chloroethane (ug/l)

Date: 2/20/03, 4:57 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



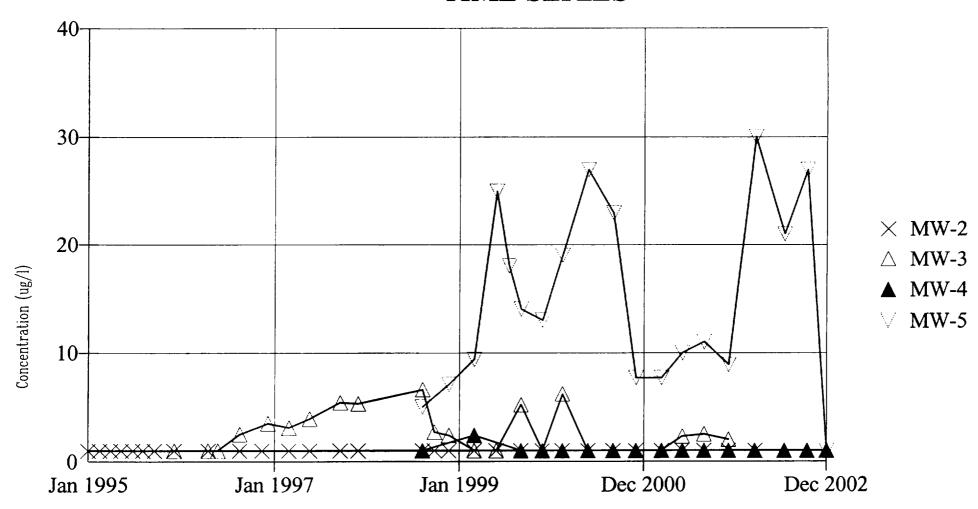
Constituent: 1,1-Dichloroethene (ug/l)

Date: 2/20/03, 4:58 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



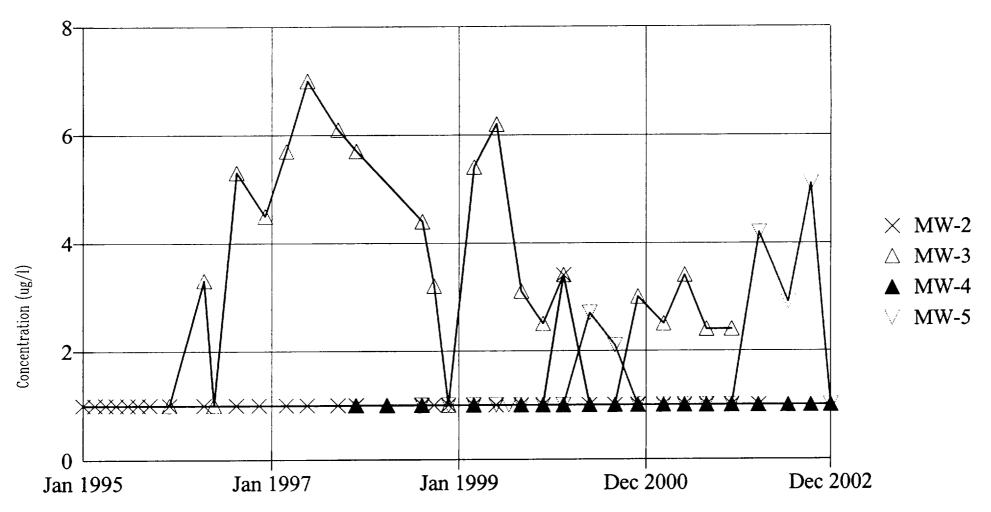
Constituent: 1,1,1-Trichloroethane (ug/l)

Date: 2/20/03, 4:59 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



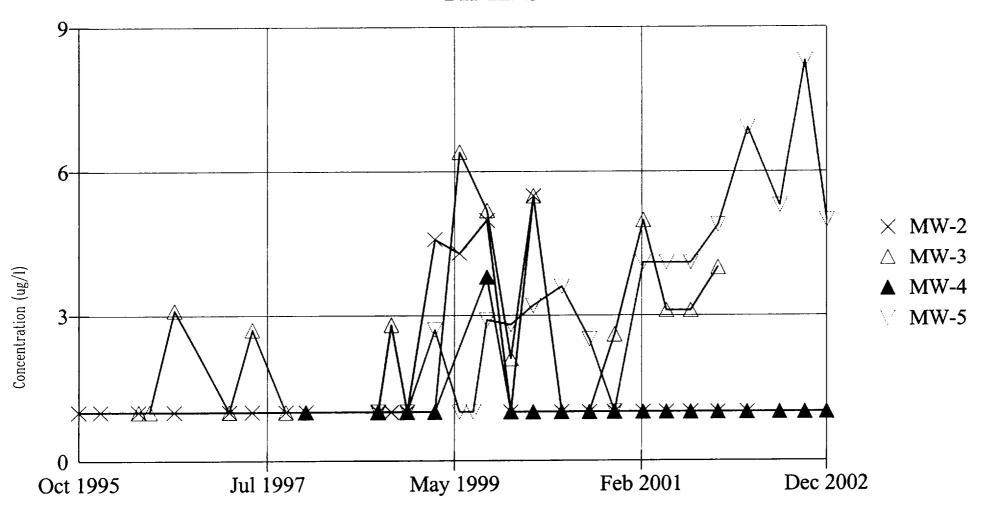
Constituent: Trichlorofluoromethane (ug/l)

Date: 2/20/03, 4:59 PM

Facility: Trans-Jordan-Cities/

Client: IGES

Data File: 2002gw



Constituent: Dichlorodifluoromethane (ug/l)

Date: 2/20/03, 5:00 PM

Facility: Trans-Jordan-Cities/

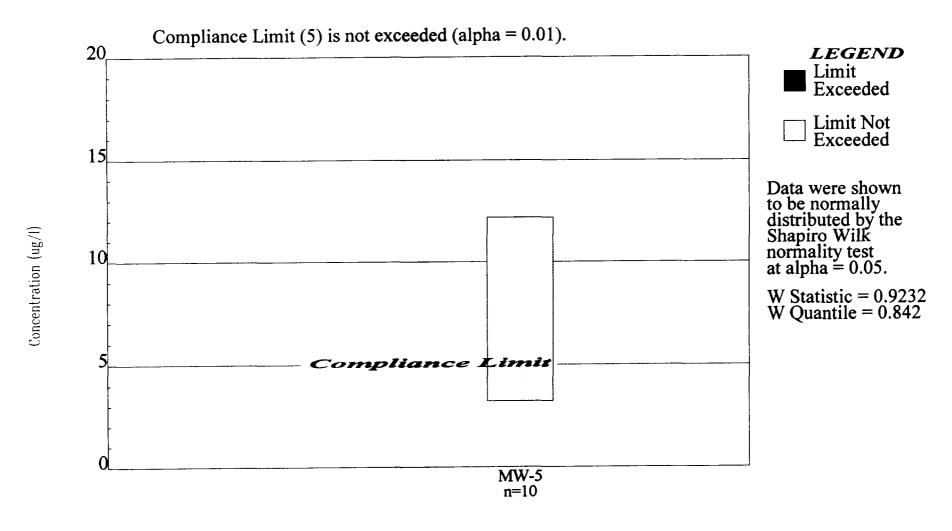
Client: IGES

Data File: 2002gw

Appendix C

(2002 Groundwater Monitoring Report)

CONFIDENCE INTERVAL



Constituent: Tetrachloroethene (ug/l)

Date: 2/20/03, 4:29 PM

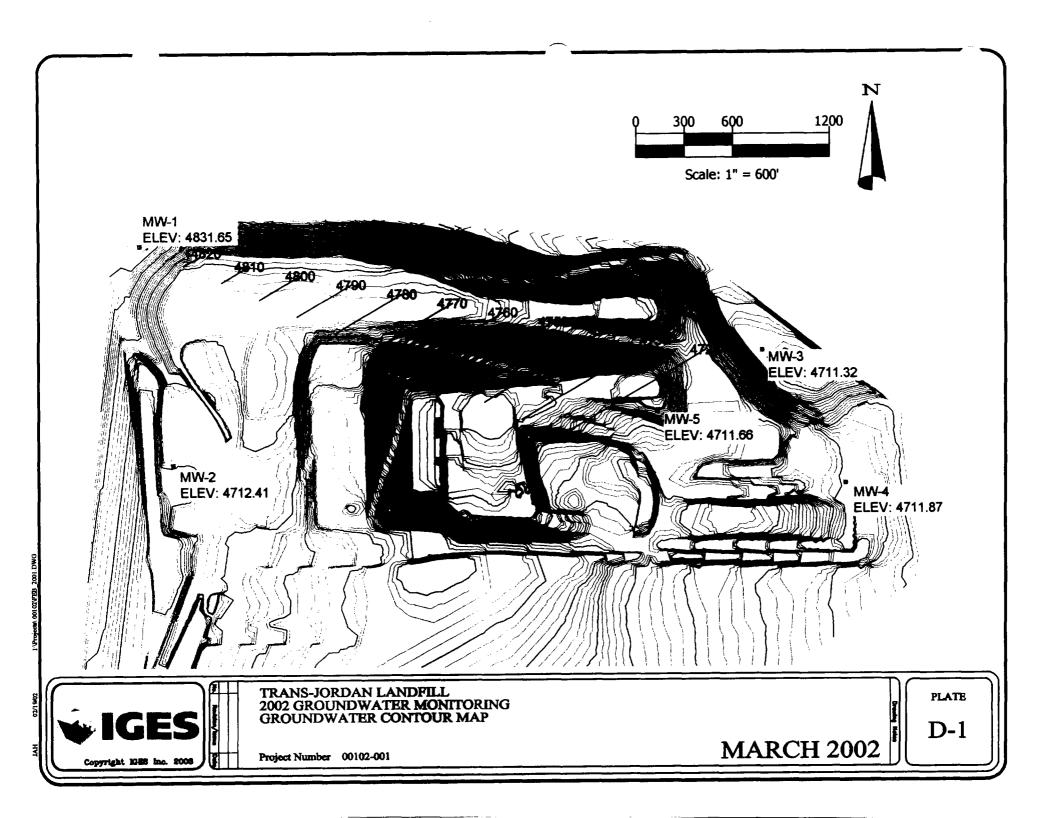
Facility: Trans-Jordan-Cities/

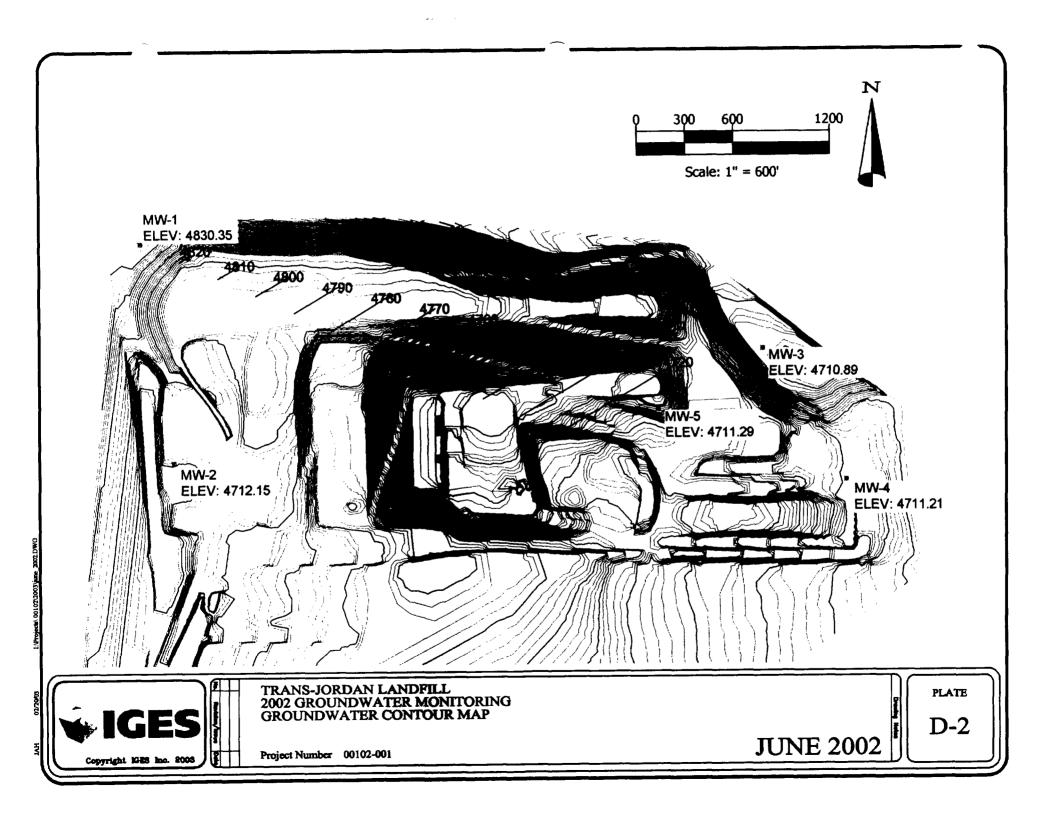
Client: IGES

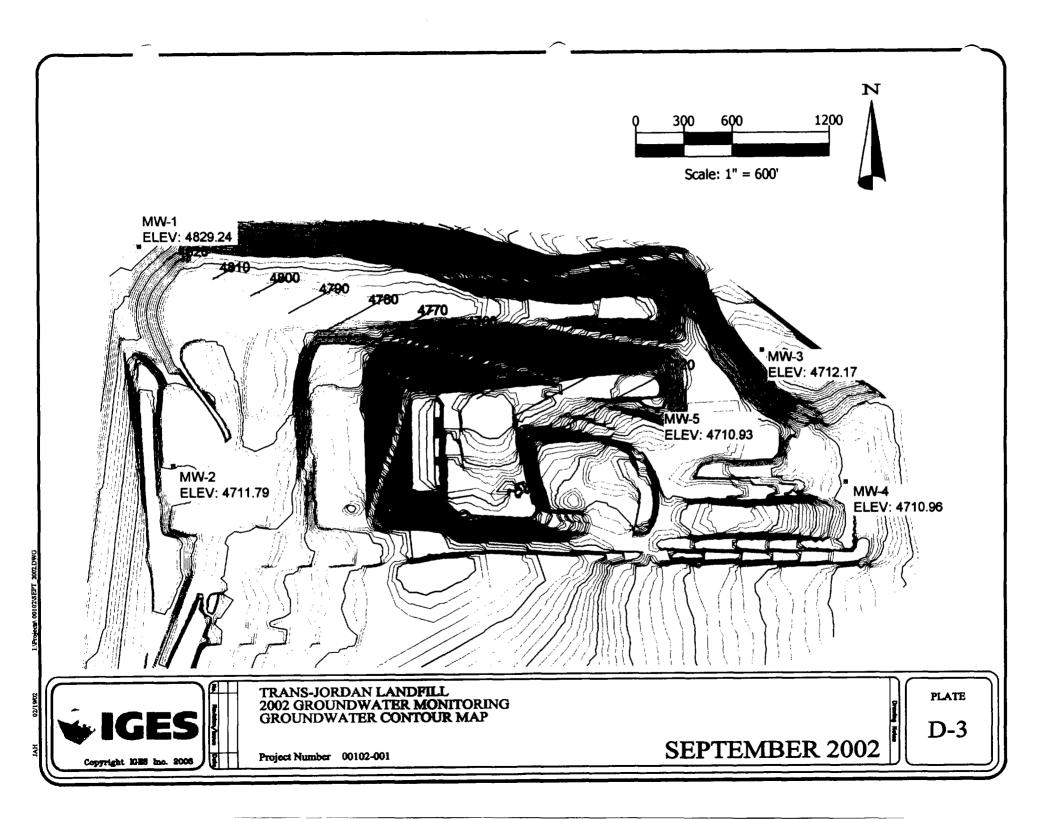
Data File: 2002gw

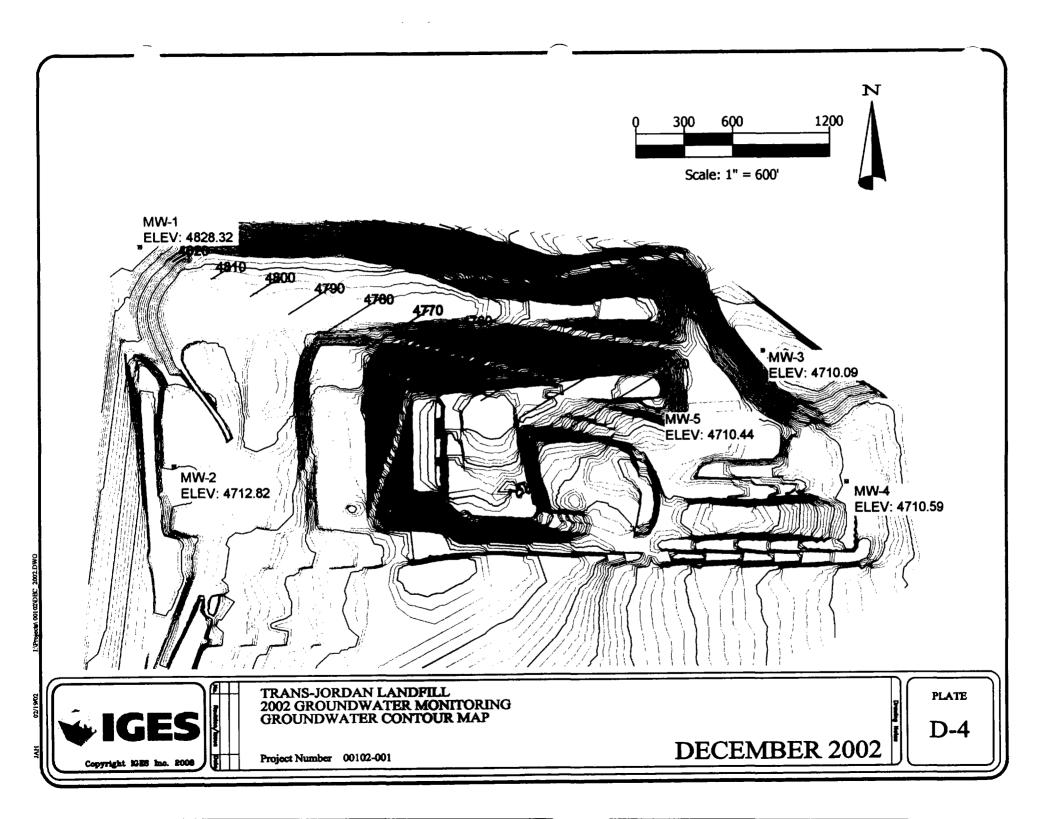
Appendix D

(2002 Groundwater Monitoring Report)











Well Identification: Northing:

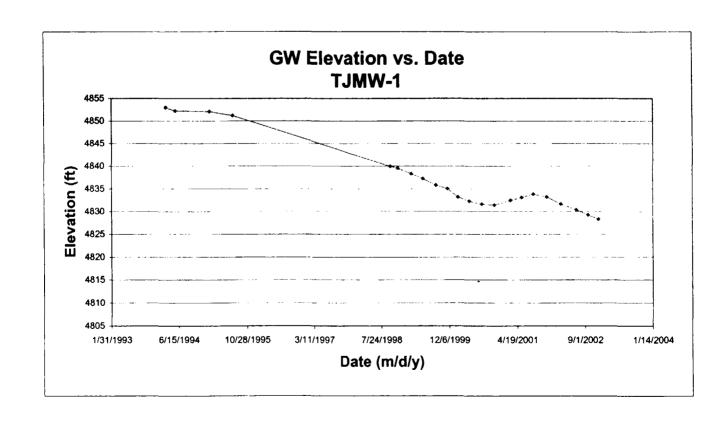
TJMW-1 811,849.27 1,844,080.58

Easting:
Well Casing Elevation (ft):
Well Depth (ft):
Well Bottom Elevation (ft):

5129.16 315.00

4814.16

Measurement	Groundwater	Groundwater	Column	Purge Volume	Final pH	Final	Final
Date (m/d/y)	Depth (ft)	Elevation (ft)	of Water (ft)	(gals)	_(pH units)	Conductivity (mmhos)	Temperature (°C)
3/11/1994	276.20	4852.96	38.80	375	7.37	1800	12.6
5/20/1994	276.94	4852.22	38.06	75	7.15	1600	12.3
1/25/1995	277.10	4852.06	37.90	75	6.99	1800	11.3
7/14/1995	278.00	4851.16	37.00	80	6.87	2000	16.7
9/28/1998	289.21	4839.95	25.79	-		•	
11/23/1998	289.63	4839.53	25.37	· ·	-		•
3/1/1999	290.85	4838.31	24.15	-		-	-
5/26/1999	291.92	4837.24	23.08	-		-	-
8/30/1999	293.37	4835.79	21.63	•	-	-	-
11/22/1999	294.10	4835.06	20.90			•	-
2/8/2000	295.98	4833.18	19.02	•	-	•	
5/1/2000	296.92	4832.24	18.08	•	· .	•	
8/1/2000	297.55	4831.61	17.45	•		•	
11/1/2000	297.75	4831.41	17.25		-		-
2/28/2001	296.73	4832.43	18.27	-		•	L'
5/21/2001	296.09	4833.07	18.91			•	
8/15/2001	295.32	4833.84	19.68	-		•	
11/20/2001	295.95	4833.21	19.05	•		•	•
3/5/2002	297.51	4831.65	17.49				
6/28/2002	298.81	4830.35	16.19				
9/24/2002	299.92	4829.24	15.08				
12/10/2002	300.84	4828.32	14.16				





TJMW-2 810,469 10 1,844,286.68 5167.77

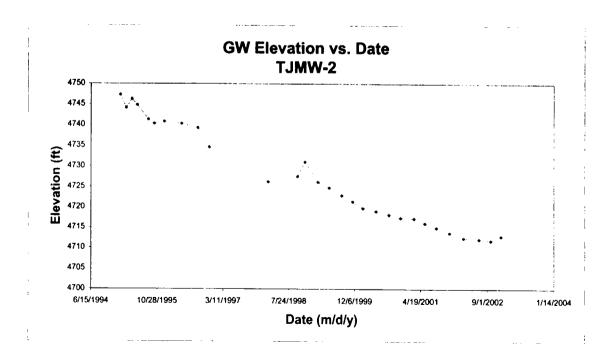
Well Identification:
Northing:
Easting:
Well Casing Elevation (ft):
Well Depth (ft):
Well Bottom Elevation (ft):

(Well Casing Extended, 2/8/00)

455 4712.77

5170.10 457.33 4712.77

Measurement	Groundwater	Groundwater	Column	Purge Volume	Final pH	Final	Final
Date (m/d/y)	Depth (ft)	Elevation (ft)	of Water (ft)	(gals)	(pH units)	Conductivity (mmhos)	Temperature (℃
1/24/1995	420.50	4747.27	34.50	350	3.89	7400	11.5
<u>3/9/1995</u>	423.70	4744.07	31.30	90	3.45	6900	12.9
4/21/1995	421.50	4746.27	33.50	85	3.57	8300	16.7
5/31/1995	423.00	4744.77	32.00	85	3.61	7400	17.6
8/22/1995	426.50	4741.27	28.50	80	3.6	6900	19.8
10/5/1995	427.50	4740.27	27.50	90	3.48	7200	13.7
12/20/1995	427.00	4740.77	28.00	75	3.71	6600	11.2
4/29/1996	427.50	4740.27	27.50	75	3.51	7200	16.5
8/30/1996	428.50	4739.27	26.50	70	3.53	4900	22.8
11/25/1996	433.20	4734.57	21.80	60	3.42	3600	10.0
2/15/1998	441.57	4726.20	13.43	45	4.04	6900	14.5
9/28/1998	440.28	4727.49	14.72	48	3.87	6950	15.0
11/23/1998	436.75	4731.02	18.25	30	3.96	6900	14.8
3/1/1999	441.62	4726.15	13.38	30	3.96	6900	14.8
5/26/1999	443.05	4724.72	11.95	45	3.96	6925	15.2
8/30/1999	444.92	4722.85	10.08	30	3.71	6640	15.3
11/22/1999	446.43	4721.34	8.57	50	3.86	7015	11.7
2/8/2000	450.37	4719.73	6.96	36	3.68	6920	14.4
5/18/2000	451.16	4718.94	6.17	33	3.61	6920	15.0
8/24/2000	451.98	4718.12	5.35	50	3.61	6710	15.8
11/20/2000	452.77	4717.33	4.56	38	3.76	6620	12.8
2/28/2001	452.88	4717.22	4.45	50	3.51	6580	13.7
5/21/2001	454.07	4716.03	3.26	47	3.59	6110	14.7
8/15/2001	455.15	4714.95	2.18	44	3.64	5950	16.1
11/20/2001	456.45	4713.65	0.88	9 (dry)	3.12	6240	13.8
3/5/2002	457.69	4712.41	-0.36	7.75 (dry)	4.61	6440	14.2
6/28/2002	457.95	4712.15	-0.62	dry		† -	17.4
9/24/2002	458.31	4711.79	-0.98	dry		 	
12/10/2002	457.28	4712.82	0.05	dry		 	





Well Identification: Northing:

TJMW-3 811,183.26 1,847,938.86

Easting: Well Casing Elevation (ft):

5029.77

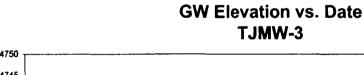
5033.63 322.86

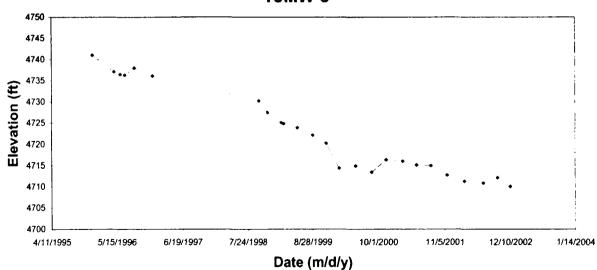
(Well Casing Extended 2/8/00)

Well Depth (ft):
Well Bottom Elevation (ft):

4710.77 4710.77

Measurement	Groundwater	Groundwater	Column	Purge Volume	Final pH	Final	Final
Date (m/d/y)	Depth (ft)	Elevation (ft)	of Water (ft)	(gais)	(pH units)	Conductivity (mmhos)	Temperature (°C
12/20/1995	288.73	4741.04	30.27	80	7.59	2800	9.5
4/29/1996	292.65	4737.12	26.35	75	7.25	3200	12.8
6/6/1996	293.28	4736.49	25.72	75	7.4	3100	19.8
7/3/1996	293.44	4736.33	25.56	75	7.34	2400	18.3
8/30/1996	291.75	4738.02	27.25	75	7.14	2200	17.5
12/18/1996	293.64	4736.13	25.36	70	7.21	2100	11.5
9/28/1998	299.55	4730.22	19.45	72	6.79	3270	13.6
11/23/1998	302.32	4727.45	16.68	53	7.33	3280	12.4
2/15/1999	304.72	4725.05	14.28	55	7.47	3250	12.2
3/1/1999	304.96	4724.81	14.04	34	7.48	3260	12.1
5/26/1999	305.88	4723.89	13.12	55	7.49	3230	12.9
8/30/1999	307.64	4722.13	11.36	45	7.11	3190	13.2
11/22/1999	309.54	4720.23	9.46	45	6.89	3270	11.7
2/8/2000	315.37	4718.26	7.49	22 (dry)	7.15	3240	12.2
5/18/2000	314.85	4718.78	8.01	26	7.21	3260	13.1
8/24/2000	316.34	4717.29	6.52	25	7.68	3130	14.8
11/20/2000	317.27	4716.36	5.59	25	6.57	3140	11.7
2/28/2001	317.58	4716.05	5.28	50	6.87	3130	11.7
5/21/2001	318.47	4715.16	4.39	39	6.81	3000	12.7
8/15/2001	318.63	4715.00	4.23	3 (dry)	7.01	3040	16.7
11/20/2001	320.84	4712.79	2.02	15 (dry)	7.23	3025	12.4
3/5/2002	322.31	4711.32	0.55	dry			
6/28/2002	322.74	4710.89	0.12	dry			
9/24/2002	321.46	4712.17	1.40	dry			
12/10/2002	323.54	4710.09	-0.68	dry			







Well Identification:

TJMW-4 810,352.05 1,848,456.17 5071.43

Northing:

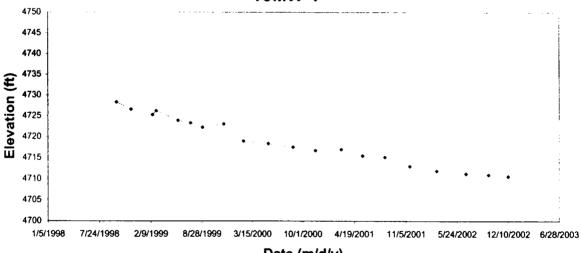
Easting:
Well Casing Elevation (ft):
Well Depth (ft):
Well Bottom Elevation (ft):

365

4706.43

Measurement	Groundwater	Groundwater	Column	Purge Volume	Final pH	Final	Final
Date (m/d/y)	Depth (ft)	Elevation (ft)	of Water (ft)	(gals)	(pH units)	Conductivity (mmhos)	Temperature (℃
9/28/1998	343.15	4728.28	21.85				
11/23/1998	344.84	4726.59	20.16	55	6.71	3110	12.5
2/15/1999	346.15	4725.28	18.85	45	7.47	3000	12.3
3/1/1999	345.21	4726.22	19.79	44	6.54	3260	12.5
5/26/1999	347.53	4723.90	17.47				-
7/14/1999	348.12	4723.31	16.88	-	-		, ,
8/30/1999	349.21	4722.22	15.79	36	6.50	2870	13.4
11/22/1999	348.37	4723.06	16.63	38	6.09	2830	11.9
2/8/2000	352.48	4718.95	12.52	44	7.02	2970	12.6
5/18/2000	353.03	4718.40	11.97	38	6.13	3000	13.0
8/24/2000	353.91	4717.52	11.09	52	7.17	3030	13.6
11/20/2000	354.71	4716.72	10.29	38	6.77	3040	12.6
2/28/2001	354.45	4716.98	10.55	55	6.88	3030	12.3
5/21/2001	355.96	4715.47	9.04	38	6.69	2900	13.2
8/15/2001	356.28	4715.15	8.72	50	7.16	2890	14
11/20/2001	358.47	4712.96	6.53	38	7.2	2925	13
3/5/2002	359.56	4711.87	5.44	29	7.22	2970	12.3
6/28/2002	360.22	4711.21	4.78	25	7.16	2890	15.1
9/24/2002	360.47	4710.96	4.53	19	7.19	3000	13.1
12/10/2002	360.84	4710.59	4.16	36	7.13	2840	12.1

GW Elevation vs. Date TJMW-4



Date (m/d/y)



Well Identification:

TJMW-5 810,800.56 1,847,286.96

Northing:

Easting:
Well Casing Elevation (ft):
Well Depth (ft):

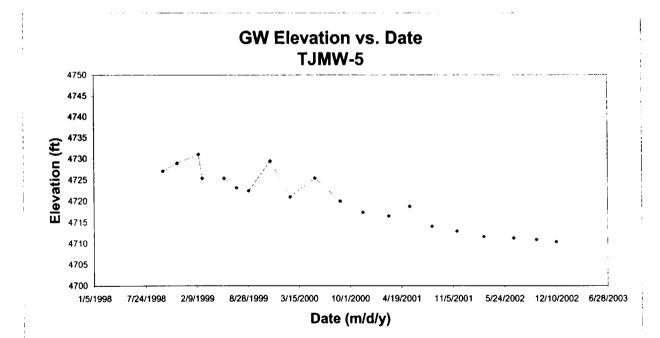
5070.9

365

Well Bottom Elevation (ft):

4705.9

Measurement	Groundwater	Groundwater	Column	Purge Volume	Final pH	Final	Final
Date (m/d/y)	Depth (ft)	Elevation (ft)	of Water (ft)	(gals)	(pH units)	Conductivity (mmhos)	Temperature (°C)
9/28/1998	343.81	4727.09	21.19		ĺ		
11/23/1998	341.96	4728.94	23.04	52	7,11	3730	12.5
2/15/1999	339.85	4731.05	25.15	53	6.88	3710	12.2
3/1/1999	345.51	4725.39	19.49	42	7.13	3760	12.2
5/26/1999	345.51	4725.39	19.49	52	6.98	3760	12.9
7/14/1999	347.72	4723.18	17.28	45	6.97	3760	13.2
8/30/1999	348.46	4722.44	16.54	52	7.08	3750	13.0
11/22/1999	341.47	4729.43	23.53	52	6.59	3730	11.8
2/8/2000	349.92	4720.98	15.08	48	6.75	3775	12.0
5/18/2000	345.47	4725.43	19.53	52	6.63	3780	12.8
8/24/2000	350.92	4719.98	14.08	55	6.94	3710	14.7
11/20/2000	353.53	4717.37	11.47	55	6.16	3600	12.0
2/28/2001	354.41	4716.49	10.59	48	6.37	3590	11.7
5/21/2001	352.14	4718.76	12.86	50	6.7	3500	12.1
8/15/2001	356.81	4714.09	8.19	52	6.23	3420	13.3
11/20/2001	357.97	4712.93	7.03	38	6.82	3420	12.7
3/5/2002	359.24	4711.66	5.76	38	7.46	3570	12.9
6/28/2002	359.61	4711.29	5.39	35	6.82	3590	13.4
9/24/2002	359.97	4710.93	5.03	32	7	3650	13.1
12/10/2002	360.46	4710.44	4.54	53	6.99	3500	12.1
12/10/2002	300.40	77.10.44	7.57	33	0.55	3300	12.1



APPENDIX L – RUN-OFF DATA



Project: Trans-Jordan Landfill	User	c: KAH	Date: 03-22-20			
C. ity: Salt Lake Subtitle: Subarea: 4.13	State: UT	Checked	d:	Date	:	
Subarea . 4.15	- <i></i>	- 		 .		- -
COVER DESCRIPTION		A A	Hydrologic B Acres	C	_	D
CULTIVATED AGRICULTURAL LANDS Row crops Cont & terraced(Cont & terraced(Cont & terraced)	&T)poor &T)good	3 (66) 1.13 (62)	- -	- -		-
Total Area (by Hydrologic Soil	Group)	4.13				
SUBAREA: 4.13 TOTAL DRAINAGE	AREA: 4.1	3 Acres	WEIGHTED	CURVE 1	NUMBER:	65 *
* - Generated for use by GRAPH:	IC method					

Project : Trans-Jordan Landfill User: KAH Date: 03-22-2004

C ity : Salt Lake State: UT Checked: ____ Date: ____

Subtitle:

Data: Drainage Area : 4.13 * Acres Runoff Curve Number : 65 * Time of Concentration: 0.50 Hours

Rainfall Type : II Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	2.6
Ia/P Ratio	0.41
Runoff (in)	0.34
Unit Peak Discharge (cfs/acre/in)	0.516
Pond and Swamp Factor 0.0% Ponds Used	1.00
reak Discharge (cfs)	1

^{* -} Value(s) provided from TR-55 system routines



Project No	00107 -CX	21	
_	Trans 1	order	1
Date _	110ns J 4/29/03	_ by _	KAH
Ckd by _		on	

Time of concentration;

$$T_1 = 0.007 (0.15.500)^{0.8} = 0.305 \text{ hrs}$$

$$T_2 = \frac{L}{3600 \text{ V}} = \frac{5600 \text{ H}}{3600 \text{ V}} = \frac{0.39 \text{ hrs}}{3600 \text{ V}}$$

North Area @ 90 peak flow: 86 (fs, @ 95: 111 (fs) @ 98= 171

User: KAH Date: 04-29-2003 Project : Trans-Jordan Landfill

C ty : Salt Lake State: UT Checked: D Subtitle: North drainage area and perimeter ditch with drain net Date: _____

: 108 Acres Data: Drainage Area

Runoff Curve Number : 95

Time of Concentration: 0.70 Hours

Rainfall Type : II Pond and Swamp Area : NONE

Storm Number	1 1
Frequency (yrs)	25
24-Hr Rainfall (in)	2.52
Ia/P Ratio	0.04
Used	0.10
Runoff (in)	1.98
Unit Peak Discharge (cfs/acre/in)	0.689
nd and Swamp Factor 0.0% Ponds Used	1.00
	-

Peak Discharge (cfs) 148

User: KAH Date: 04-29-2003 Project : Trans-Jordan Landfill

Cl ty: Salt Lake State: UT Checked: ____ Date: ____ Subtitle: South drainage area and perimeter ditch with drain net

Data: Drainage Area : 81 Acres
Runoff Curve Number : 95
Time of Concentration: 0.70 Hours

Rainfall Type : II Pond and Swamp Area : NONE

Storm Number	1 1
Frequency (yrs)	25
24-Hr Rainfall (in)	2.52
Ia/P Ratio	0.04
Used	0.10
Runoff (in)	1.98
Unit Peak Discharge (cfs/acre/in)	0.689
(nd and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	111

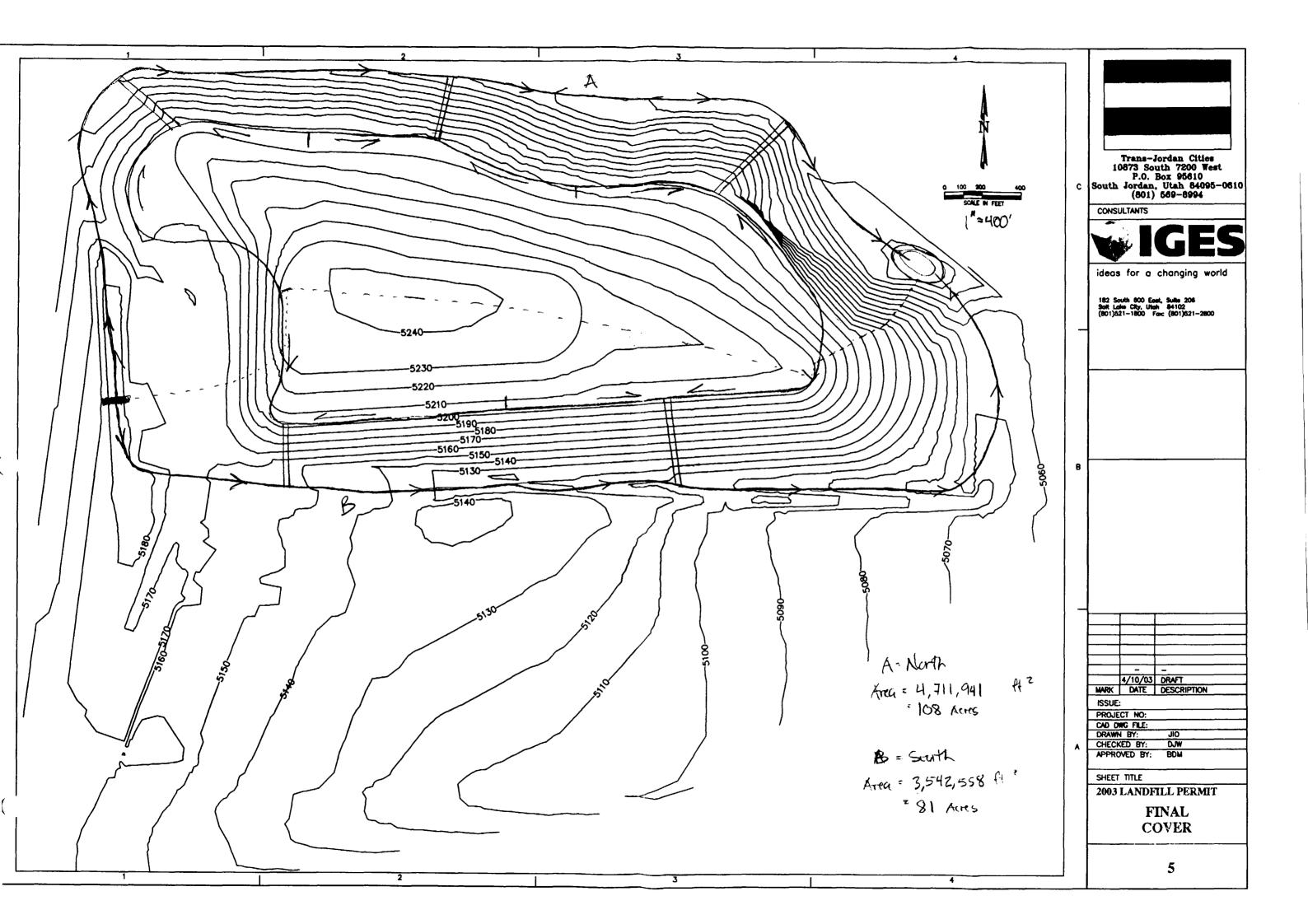
Trapazoidal and Triangular Channel Design: Trans-Jordan Landfill

Given:					
	Q=	148	cfs	Channel A	
	Q=	111	cfs	Channel B	

Mannings Ed	uation	Variat	oles:
n=	0.03		Vegetated
Slope=			Channel Bed
m =	2	feet	Channel Side Slope
b=	2	feet	Channel Bottom Width
y=	(var)	feet	Depth of Flow

	TRAPAZOIDAL				TRIANGULAR			
	guess "y"	result "Q"	Flow Depth	Velocity	guess "y"	result "Q"	Flow Depti	Velocity
Channel A Q=3 cfs	2.04	148.12	2.04	11.94	2.5	149.54	2.50	11.96
Channel B Q=3 cfs	1.8	112.17	1.80	11.13	2.25	112.91	2.25	11.15

CHANNEL DESIGN: (feet)						CONSTRUCTION DIMENSIONS (feet)				
	TRAPAZOID		TRIANGLE		TRAPAZOID		TRIANGLE			
	Depth	Top Width	Depth	Top Width	Depth	Top Width	Depth	Top Width		
Channel A	2.04	10.16	2.50	10	2.5	10	3	12		
Channel B	1.80	9.2	2.25	9	2.3	7.5	2.75	11		



APPENDIX M - SLOPE STABILITY



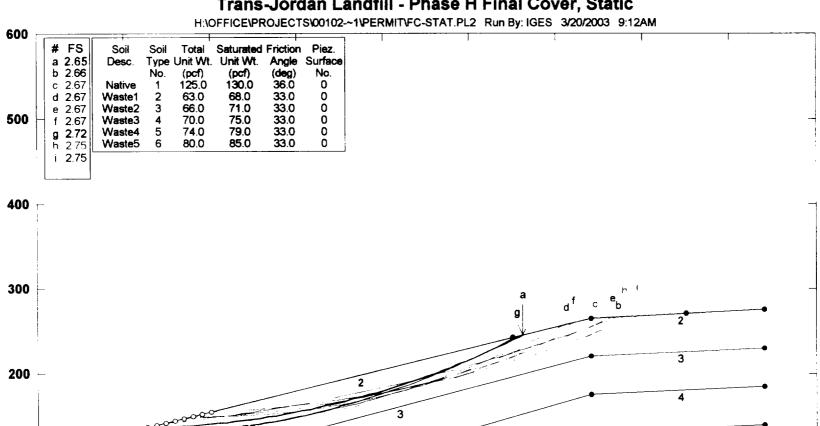
Trans-Jordan Landfill - Cell 5 Excavation, Static

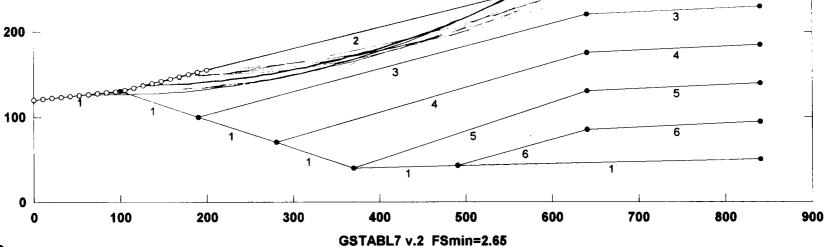
H:\OFFICE\PROJECTS\00102-~1\PERMIT\EX-STAT.PL2 Run By: IGES 3/19/2003 5:24PM 400 # FS Soil Total Saturated Friction Piez. Type Unit Wt. Unit Wt. Angle Surface Soil a 2.26 b 2.26 Desc. (pcf) 130.0 68.0 (deg) 36.0 33.0 No. 0 0 (pcf) No. c 2.28 125.0 Native 63.0 d 2.29 Waste 2 e 2.30 f 2.33 g 2.34 h 235 i 2.36 300 200 📙 hf 100 100 200 300 400 500



GSTABL7 v.2 FSmin=2.26
Safety Factors Are Calculated By The Modified Bishop Method

Trans-Jordan Landfill - Phase H Final Cover, Static

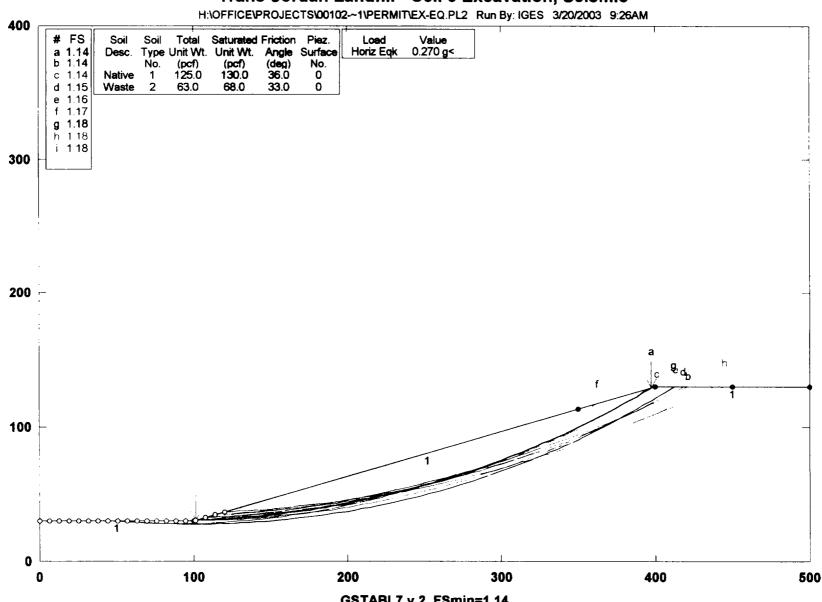






Safety Factors Are Calculated By The Modified Bishop Method

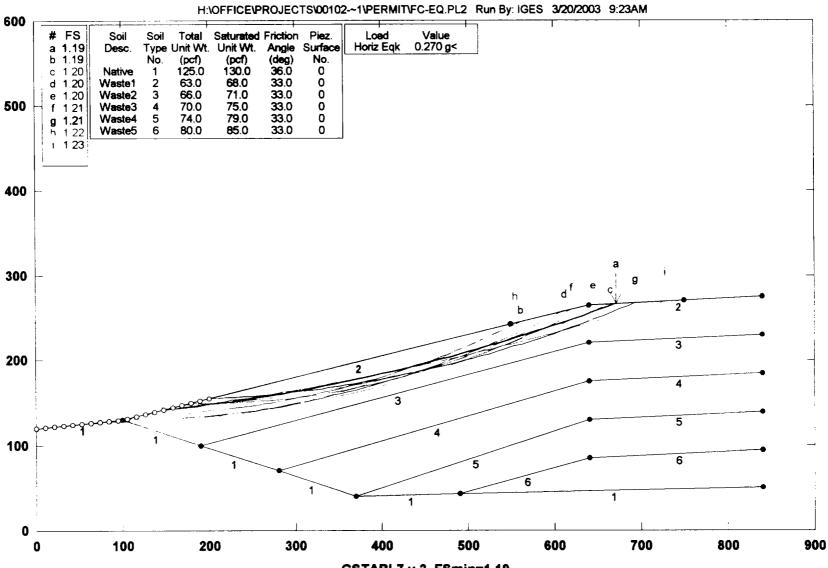
Trans-Jordan Landfill - Cell 5 Excavation, Seismic





GSTABL7 v.2 FSmin=1.14
Safety Factors Are Calculated By The Modified Bishop Method

Trans-Jordan Landfill - Phase H Final Cover, Seismic

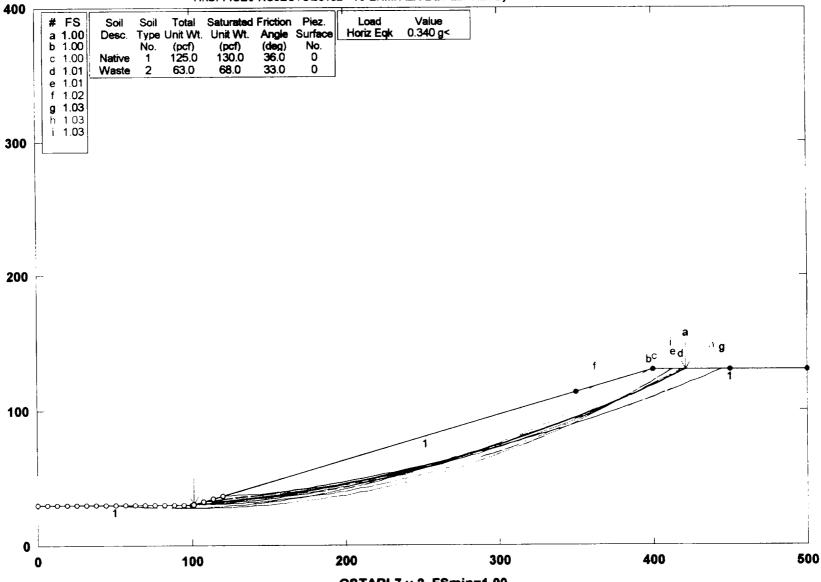




GSTABL7 v.2 FSmin=1.19
Safety Factors Are Calculated By The Modified Bishop Method

Trans-Jordan Landfill - Cell 5 Excavation, Yield Acceleration

H:\OFFICE\PROJECTS\00102~1\PERMIT\EX-EQ.PL2 Run By: IGES 3/20/2003 9:29AM





GSTABL7 v.2 FSmin=1.00
Safety Factors Are Calculated By The Modified Bishop Method

Trans-Jordan Landfill - Phase H Final Cover, Yield Acceleration

H:\OFFICE\PROJECTS\00102~1\PERMIT\FC-EQ.PL2 Run By: IGES 3/20/2003 9:24AM 600 Load Value Horiz Eqk 0.360 g< Saturated Friction Piez.

Unit Wt. Angle Surface # FS Total Soil Angle (deg) 36.0 33.0 33.0 a 0.99 Desc. Type Unit Wt. (pcf) 130.0 68.0 (pcf) 125.0 63.0 No. b 1.00 No. 0 c 1.00 Native 0 d 1.00 Waste1 66.0 71.0 0 Waste2 500 Waste3 70.0 33.0 0 33.0 33.0 79.0 85.0 74.0 g 1.01 Waste4 80.0 Waste5 h 101 i 1.02 400 300 200 100 6 500 600 700 800 900 100 200 300 400



GSTABL7 v.2 FSmin=0.99
Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX N – BINGHAM CREEK FLOW MODEL



Bingham Creek Flow Model for Trans Jordan Landfill

1. INTRODUCTION

Due to the location of Bingham Creek adjacent to the Trans Jordan Landfill, concerns have been raised regarding the impact on the landfall of high flows in the creek. In order to determine the behavior of Bingham Creek during the design (100-year, 24-hour) storm, its hydrology and hydraulics were evaluated based on a site visit, normal flow calculations, and the use of the HEC-1 and HEC-2 models of the United States Army Corps of Engineers (USACE). Modeling results indicate that channel flows during the design storm would remain well away from the landfill boundary.

2. DESIGN STORM RUNOFF

In order to evaluate the peak flow occurring during the design storm, first the rainfall distribution was evaluated. Next, a HEC-1 model was constructed to route this storm through the Bingham Creek watershed to a point adjacent to theeastern edge of the landfill. A flood hydrograph for the channel at the eastern (downstream) end of the landfill was constructed.

2.1. RAINFALL

NOAA Atlas 2 Volume 6 was used to calculate rainfall depths during the 100-year, 24-hour event. Storm durations and depths for fractions of the 24-hour storm are listed in Table 1.

Table 1: 100-Year, 24-Hour Storm				
Storm Duration	Depth, inches			
5 minutes	0.43			
10 minutes	0.70			
15 minutes	0.88			
30 minutes	1.22			
1 hours	1.55			
2 hours	1.80			
3 hours	2.00			
6 hours	2.40			
12 hours	3.05			
24 hours	3.70			

2.2. HEC-1 FLOW MODEL

1

A HEC-1 model was constructed for the watershed downstream of the Kennecott Bingham Creek Dam, located approximately one mile upstream of the landfill. The area upstream of the dam was not included because it was assumed that flows from this area would be captured either within the copper mine or by the dam.

HEC-1 uses the design storm in combination with watershed characteristics to calculate the runoff hydrograph at the base of the watershed. Watershed characteristics used in the model are as follows:

- Area -- 0.96 square miles;
- Lag time, (based on <u>Design of Small Dams</u>, USBR, 1987) -- 0.78 hours; and
- Runoff Curve Number (based on <u>Soil Survey of Salt Lake Area, Utah</u>, USDA SCS, 1974), Antecedent Moisture Condition II -- 85.

HEC-1 input and output are included in Appendix A. The hydrograph in the creek at the east edge of the landfill is shown with the rainfall distribution in Figure 1. As shown by the hydrograph, the estimated peak flow is 564 cubic feet per second (cfs).

3. ROUTING OF DESIGN FLOOD

The peak flow modeled by HEC-1 (564 cfs) was evaluated for depth and velocity using two methods at two locations: (1) normal flow calculations (using FlowMasterTM) for the culvert passing under Highway 111 upstream of the landfill; and (2) HEC-2 flow modeling for the channel adjacent to the landfill.

3.1. HIGHWAY 111 CULVERT

The Highway 111 culvert was surveyed during a site visit conducted on 13 December 1995. The culvert is constructed of concrete; its dimensions are 8 feet ft wide by 6 ft high by 65 feet long, with a slope of 0.0057 ft/ft. FlowMasterTM, distributed by Haestad Methods, Inc., was used to calculate normal flow in an 8-ft wide rectangular channel with Manning's n of 0.013.

Appendix B shows contains the output from FlowMasterTM. The depth and velocity of 564 cfs passing through the culvert are 4.84 ft and 14.56 ft/s, respectively. This indicates that the culvert has sufficient capacity to convey the design flood. The velocity of flow exiting the culvert is high enough to cause channel erosion downstream of the exit. Channel protection, which has been placed downstream of the outlet, decreases the possibility of channel damage where the flow expands to fill the entire channel.

3.2. HEC-2 MODEL OF CHANNEL ADJACENT TO LANDFILL

Properties of flow in the channel adjacent to the landfill were evaluated using Boss HEC-2, a version of the USACE HEC-2 flood routing model that is linked directly with AutoCAD to provide accurate model representations of channel and floodplain topography.

3.2.1. Model Inputs

Inputs to the HEC-2 model were as follows:

- Flow: 564 cfs, the peak flow from the HEC-1 model.
- Manning's n (roughness): Bingham Creek below the Kennecott Dam often carries no flow. As a result, the channel is covered with grass and small shrubs in most places, with only a few hundred feet devoid of vegetation. As such, the channel material can be approximated by a weedy floodplain, with scattered brush. According to Open Channel Hydraulics (Chow, 1959), the average Manning's n for this condition is 0.05.

Manning's n's of 0.05 and 0.07 were selected for the channel and floodplains, respectively. The choice of an average roughness results in a level of conservatism that is intermediate between flow depth and velocity, since high values of Manning's n produce deep water and low velocities, while low values produce shallow water and high velocities. It was apparent during the site visit that the bed surface is more smooth in the upstream portion modeled (sections 120 and up in Figure 2) than in the downstream portion modeled. Thus, the value of Manning's n may be lower upstream, but flood flow and any associated erosion in this area would remain well away from the landfill boundary, as discussed in the following section.

• Boundary between channel and floodplain: The boundary between channel and flood plain at each section was set at the location where the banks are two feet above the channel bottom, the approximate average boundary between bed and bank materials.

Cross sections of the HEC-2 model, overlaid on a topographic map of the creek, are shown in Figure 2. The HEC-2 input file is contained in Appendix C.

3.2.2. Model Results

The results of the HEC-2 model include the calculated area of inundation and the distribution of flow depth and velocity. Figure 2 shows the estimated inundated area from the 100-year 24-hour flood is well away from the landfill boundary. Table 2 shows the distance between the 100-year flood surface and the landfill boundary for selected sections, including those where the water is closest to the landfill boundary. The minimum horizontal separation is 16 ft at section 95; the minimum vertical separation is 4.4 ft at section 165. Comparing the vertical distance between the landfill boundary and the flood surface with the flow depth (also shown in Table 2), it is apparent that the flow depth could more than double without reaching the elevation of the landfill boundary.

Table 2: Distance between 100-Year Flood Surface and Landfill Boundary							
Section	Horizontal Distance, ft	Vertical Distance, ft	Water Depth, ft				
45	184	11.1	2.8				
60	57	9.2	2.8				
70	36	9.0	3.0				
80	66	8.1	2.4				
90	42	7.3	2.3				
95ª	16	4.8	2.7				
100	35	7.6	3.9				
105	55	8.0	2.0				
115	45	5.9	3.0				
125	125	7.7	1.3				
140	280	10.4	1.6				
165	163	4.4	2.1				

^a Section with water surface closest to the landfill.

Figure 3 shows the depth and velocity at each cross section (5 through 165). The average depth is 2.3 ft; the average velocity is 6.1 ft/s. It is evident that the flow is faster in the downstream reaches, where the channel is more constricted. All HEC-2 output is included in Appendix C.

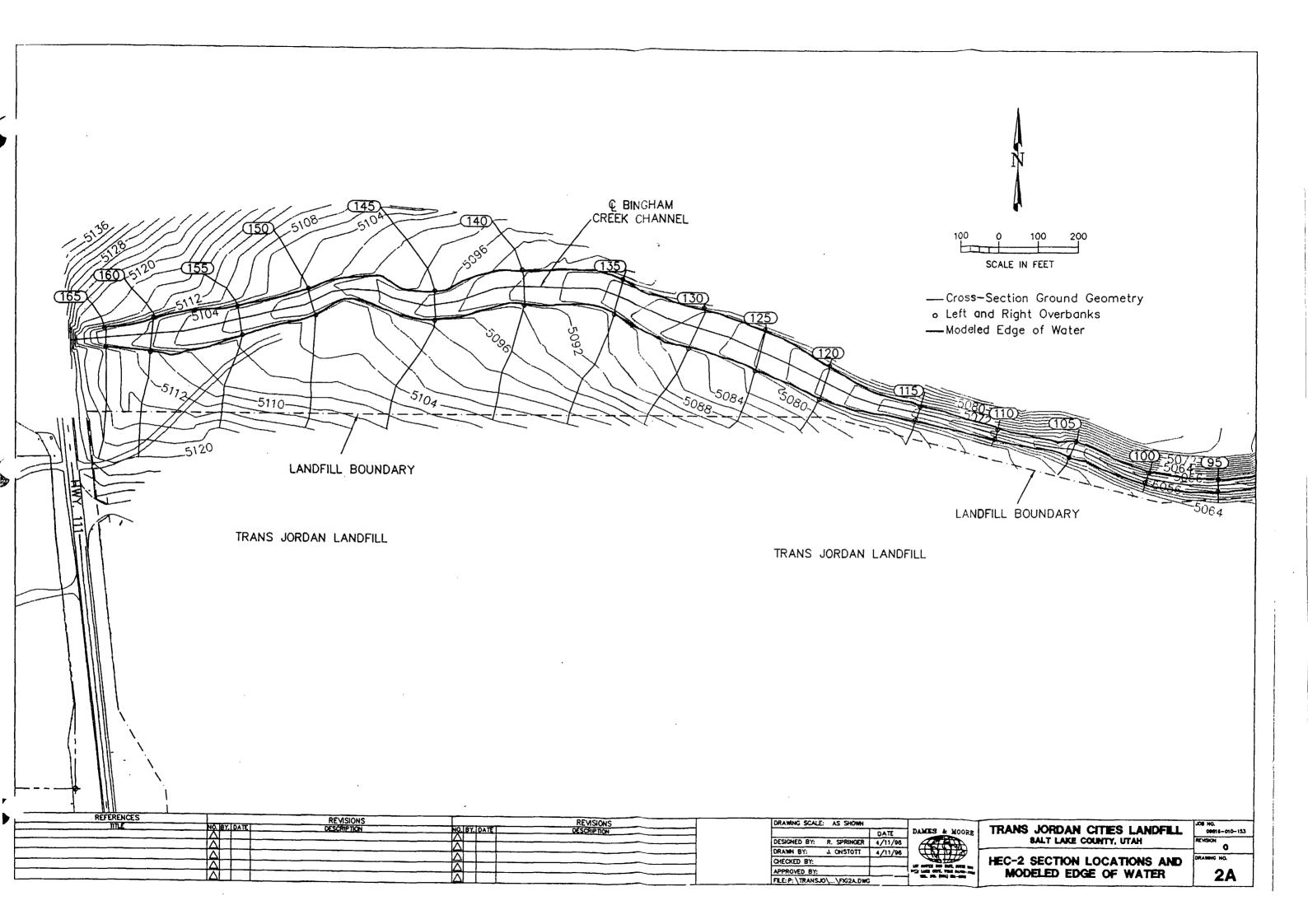
Review of the HEC-2 output file warning and status messages indicate two issues that should be addressed, namely conveyance changes and critical depth. The HEC-2 output indicates that the conveyance change between adjacent cross sections is "outside acceptable range" for 9 sections. The default definition of the "acceptable range" in HEC-2 is fairly tight (0.7 to 1.4). However, the USACE (which developed HEC-2) uses an acceptable range of 0.5 to 2.0 in practice. All conveyance changes are within this range.

Critical depth was assigned at 6 sections, as listed in Table 3. To verify that HEC-2 was calculating critical depth correctly and that the assumption of critical depth was appropriate, FlowMasterTM was utilized to calculate critical and normal depths for each of the 6 sections. Output is included in Appendix A. Calculated critical depths matched those calculated by HEC-2. Table 3 shows that normal depths are within 0.66 ft of critical depths, but the difference is usually less than 0.2 ft. Thus, the assumption of critical depth at these sections is not unreasonable.

Table 3. Normal and Critical Flow Elevations at Sections where HEC-2 Assumed Critical Depth								
Section	Critical Flow Elevation, ft	Normal Flow Elevation, ft	Difference, ft					
35	5005.82	5006.00	0.18					
55	5027.67	5027.49	-0.18					
65	5034.77	5035.43	0.66					
85	5046.22	5046.86	0.64					
105	5062.03	5062.07	0.04					
160	5109.22	5109.33	0.11					

4. SUMMARY

A model of the 100-year, 24-hour flood in Bingham Creek adjacent to Trans Jordan Landfill was constructed. Total rainfall for the storm was 3.7 inches, with a maximum intensity of 0.43 inches in 5 minutes. The hydrologic model constructed for this watershed (HEC-1) predicted a peak flow of 564 cfs for this event. The hydraulic model constructed for this reach of channel (HEC-2) predicted an average flow depth of 2.3 ft and an average velocity of 6.1 ft/s in the reach of Bingham Creek adjacent to the landfill. The flooded area was not predicted to reach the landfill boundary.



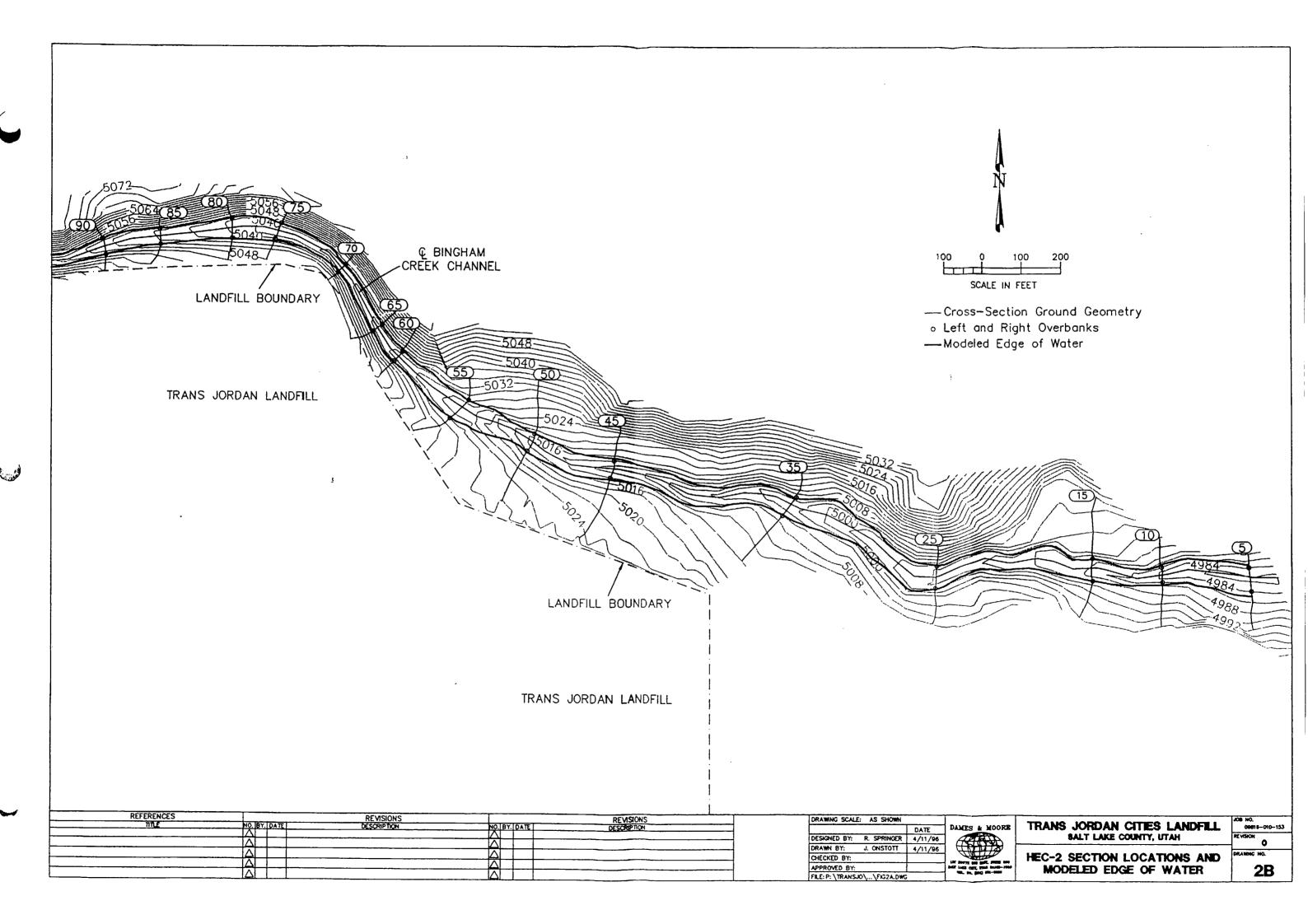


Figure 1. 100-Year, 24-Hour Rainfall and Runoff

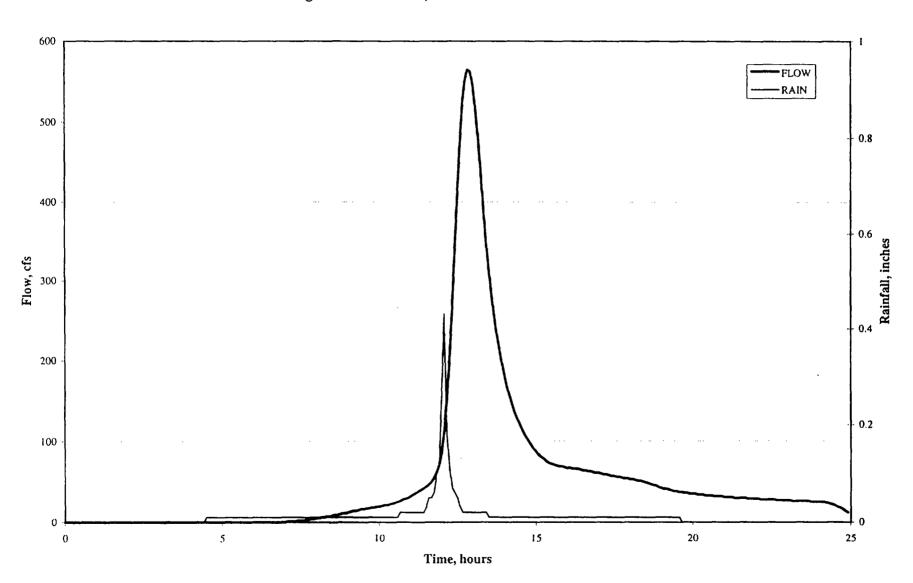
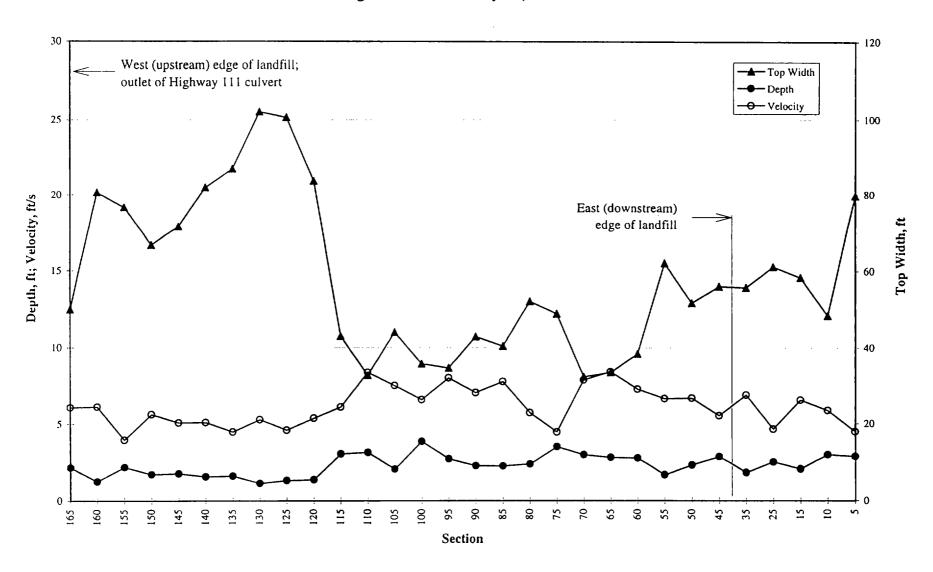


Figure 3. Modeled Depth, Velocity, and Top Width of Bingham Creek during Peak Flow of 100-year, 24-hour Flood



APPENDIX A

HEC-1 Input and Output

HMVersion: 6.33 Data File: DSHEC1.DAT

FLOOD HYDROGRAPH PACKAGE (HEC-1) * MAY 1991 VERSION 4.0.1E RUN DATE 12/22/1995 TIME 17:59:13 *

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

X	X	XXXXXXX	XX	xxx		Х
X	X	X	X	X		XX
X	X	X	X			X
XXX	XXXX	XXXX	X		XXXXX	X
X	X	X	Х			X
X	X	X	X	X		х
X	Х	XXXXXX	XX	XXX		XXX

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*************************************
::: Full Microcomputer Implementation :::
    by
:::
    Haestad Methods, Inc.
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37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE: GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

LINE	ID.	1	23.	4.	5	6.	7	8	9	10
1	ID	BING	HAM CREEK BEL	OW DAM 1	00-YEAR F	L000				
2	11	5		300						
3	10	0								
4	KK	BOTTOMSTAT	ION AT BASE O	F TRANS .	JORDAN LA	NDFILL				
5	KM	100	YR 24-HOUR FL	00D						
6	ВА	0.96								
7	PH		0.43	0.88	1.55	1.80	2.00	2.40	3.05	3.70
8	LS		85							
9	מט	0.78								
10	22									

HEC1 S/N: 1346000053 HMVersion: 6.33 Data File: DSHEC1.DAT

FLOOD HYDROGRAPH PACKAGE (HEC-1) *

MAY 1991

VERSION 4.0.1E

RUN DATE 12/22/1995 TIME 17:59:13 *

U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC ENGINEERING CENTER 609 SECOND STREET DAVIS, CALIFORNIA 95616 (916) 756-1104

BINGHAM CREEK BELOW DAM 100-YEAR FLOOD

3 10 OUTPUT CONTROL VARIABLES

> IPRNT 0 PRINT CONTROL

IPLOT 0 PLOT CONTROL

QSCAL O. HYDROGRAPH PLOT SCALE

ΙT HYDROGRAPH TIME DATA

> NMIN 5 MINUTES IN COMPUTATION INTERVAL

IDATE 1 0 STARTING DATE ITIME 0000 STARTING TIME

NQ 300 NUMBER OF HYDROGRAPH ORDINATES

2 0 ENDING DATE NDDATE 0055 ENDING TIME NDTIME ICENT 19 CENTURY MARK

COMPUTATION INTERVAL 0.08 HOURS TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

DRAINAGE AREA SQUARE MILES

PRECIPITATION DEPTH INCHES FEET

LENGTH, ELEVATION

FLOW CUBIC FEET PER SECOND

STORAGE VOLUME ACRE-FEET SURFACE AREA ACRES

TEMPERATURE DEGREES FAHRENHEIT

4 KK BOTTOM * STATION AT BASE OF TRANS JORDAN LANDFILL

100 YR 24-HOUR FLOOD

SUBBASIN RUNOFF DATA

6 BA SUBBASIN CHARACTERISTICS

TAREA 0.96 SUBBASIN AREA

85.00 CURVE NUMBER

0.00 PERCENT IMPERVIOUS AREA

PRECIPITATION DATA

PH	HY	DRO-35		DEPTHS FO						TP	-49	
		5-MIN		2-HR	3-HR	6-HR		24-HR	2-DAY	4-DAY		10-DAY 0.00
					STORM	AREA =	0.96					
8 LS	SCS LOSS	RATE RTL	0.35	5 INITIAL	ABSTRAC	CTION						

9 UD SCS DIMENSIONLESS UNITGRAPH

CRVNBR RTIMP

TLAG 0.78 LAG

				וואט	HYDROGRAP	PH .			
				49 END-OF	-PERIOD OR	DINATES			
17.	58.	110.	180.	273.	380.	469.	529.	560.	564.
554.	518.	477.	429.	369.	303.	250.	211.	179.	152.
131.	112.	94.	79.	68.	57.	49.	41.	35.	29.
25.	21.	18.	15.	13.	11.	9.	8.	7.	6.
5.	4.	4.	3.	2.	2.	1.	1.	0.	

HYDROGRAPH AT STATION BOTTOM

								*							******
DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA MO	N HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
								*							
1		0000	1	0.00	0.00	0.00	0.	*	1	1230	151	0.05	0.01	0.04	405.
1		0005	2	0.00	0.00	0.00	0.	*	1	1235	152	0.03	0.01	0.02	470.
1		0010	3	0.00	0.00	0.00	0.	*	1	1240	153	0.02	0.00	0.02	520.
1		0015	4	0.00	0.00	0.00	0.	*	1	1245	154	0.02	0.00	0.02	551.
1		0020	5	0.00	0.00	0.00	0.	*	1	1250	155	0.02	0.00	0.02	564.
1		0025	6	0.00	0.00	0.00	0.	*	1	1255	156	0.02	0.00	0.02	562.
1		0030	7	0.00	0.00	0.00	0.	*	1	1300	157	0.02	0.00	0.01	545.
1		0035	8	0.00	0.00	0.00	0.	*	1	1305	158	0.02	0.00	0.02	518.
1		0040	9	0.00	0.00	0.00	0.	*	1	1310	159	0.02	0.00	0.01	482.
1		0045	10	0.00	0.00	0.00	0.	*	1	1315	160	0.02	0.00	0.01	440.
1		0050	11	0.00	0.00	0.00	0.	*	1	1320	161	0.02	0.00	0.01	395.
1		0055	12	0.00	0.00	0.00	0.	*	1	1325	162	0.02	0.00	0.01	353.
1	1	0100	13	0.00	0.00	0.00	0.	*	1	1330	163	0.01	0.00	0.01	. 317.
1	1	0105	14	0.00	0.00	0.00	0.	*	1	1335	164	0.01	0.00	0.01	286.
1	1	0110	15	0.00	0.00	0.00	0.	*	1	1340	165	0.01	0.00	0.01	259.
1	1	0115	16	0.00	0.00	0.00	0.	*	1	1345	166	0.01	0.00	0.01	236.
1	1	0120	17	0.00	0.00	0.00	0.	*	1	1350	167	0.01	0.00	0.01	216.
1	- 1	0125	18	0.00	0.00	0.00	0.	*	1	1355	168	0.01	0.00	0.01	198.
1	(0130	19	0.00	0.00	0.00	0.	*	1	1400	169	0.01	0.00	0.01	182.
1	ı	0135	20	0.00	0.00	0.00	0.	*	1	1405	170	0.01	0.00	0.01	168.
1	(0140	21	0.00	0.00	0.00	0.	*	1	1410	171	0.01	0.00	0.01	156.
1	(0145	22	0.00	0.00	0.00	0.	*	1	1415	172	0.01	0.00	0.01	145.
1	(0150	23	0.00	0.00	0.00	0.	*	1	1420	173	0.01	0.00	0.01	135.

1	0155	24	0.00	0.00	0.00	0.	*	1	1425	174	0.01	0.00	0.01	127.
1	0200	25	0.00	0.00	0.00	0.	*	1	1430	175	0.01	0.00	0.01	119.
1	0205	26	0.00	0.00	0.00	0.	*	1	1435	176	0.01	0.00	0.01	112.
1	0210	27	0.00	0.00	0.00	0.	*	1	1440	177	0.01	0.00	0.01	106.
1	0215	28	0.00	0.00	0.00	0.	*	1	1445	178	0.01	0.00	0.01	101.
1	0220	29	0.00	0.00	0.00	0.	*	1	1450	179	0.01	0.00	0.01	96.
1	0225	30	0.00	0.00	0.00	0.	*	1	1455	180	0.01	0.00	0.01	91.
1	0230	31	0.00	0.00	0.00	0.	*	1	1500	181	0.01	0.00	0.01	87.
1	0235	32	0.00	0.00	0.00	0.	*	1	1505	182	0.01	0.00	0.01	83.
1	0240	33	0.00	0.00	0.00	0.	*	1	1510	183	0.01	0.00	0.01	80.
1	0245	34	0.00	0.00	0.00	0.	*	1	1515	184	0.01	0.00	0.01	78.
1	0250	35	0.00	0.00	0.00	0.	*	1	1520	185	0.01	0.00	0.01	75.
1	0255	36	0.00	0.00	0.00	0.	*	1	1525	186	0.01	0.00	0.01	73.
1	0300	37	0.00	0.00	0.00	0.	*	1	1530	187	0.01	0.00	0.01	72.
1	0305	38	0.00	0.00	0.00	0.	*	1	1535	188	0.01	0.00	0.01	71.
1	0310	39	0.00	0.00	0.00	0.	*	1	1540	189	0.01	0.00	0.01	70.
1	0315	40	0.00	0.00	0.00	0.	*	1	1545	190	0.01	0.00	0.01	69.
1	0310	41	0.00	0.00	0.00	0.	*	1	1550	191	0.01	0.00	0.01	69.
	0325			0.00			*						0.01	68.
1		42	0.00		0.00	0.	*	1	1555	192	0.01	0.00		67.
1	0330	43	0.00	0.00	0.00	0.		1	1600	193	0.01	0.00	0.01	
1	0335	44	0.00	0.00	0.00	0.	*	1	1605	194	0.01	0.00	0.01	67.
1	0340	45	0.00	0.00	0.00	0.	*	1	1610	195	0.01	0.00	0.01	66.
1	0345	46	0.00	0.00	0.00	0.	*	1	1615	196	0.01	0.00	0.01	66.
1	0350	47	0.00	0.00	0.00	0.	*	1	1620	197	0.01	0.00	0.01	66.
1	0355	48	0.00	0.00	0.00	0.	*	1	1625	198	0.01	0.00	0.01	65.
1	0400	49	0.00	0.00	0.00	0.	*	1	1630	199	0.01	0.00	0.01	64.
1	0405	50	0.00	0.00	0.00	0.	* .	1	1635	200	0.01	0.00	0.01	64.
1	0410	51	0.00	0.00	0.00	0.	*	1	1640	201	0.01	0.00	0.01	63.
1	0415	52	0.00	0.00	0.00	0.	*	1	1645	202	0.01	0.00	0.01	63.
1	0420	53	0.00	0.00	0.00	0.	*	1	1650	203	0.01	0.00	0.01	62.
1	0425	54	0.00	0.00	0.00	0.	*	1	1655	204	0.01	0.00	0.01	61.
1	0430	55	0.01	0.01	0.00	0.	*	1	1700	205	0.01	0.00	0.01	61.
1	0435	56	0.01	0.01	0.00	0.	*	1	1705	206	0.01	0.00	0.01	60.
1	0440	57	0.01	0.01	0.00	0.	*	1	1710	207	0.01	0.00	0.01	59.
1	0445	58	0.01	0.01	0.00	0.	*	1	1715	208	0.01	0.00	0.01	59.
1	0450	59	0.01	0.01	0.00	0.	*	1	1720	209	0.01	0.00	0.01	58.
1	0455	60	0.01	0.01	0.00	0.	*	1	1725	210	0.01	0.00	0.01	57.
1	0500	61	0.01	0.01	0.00	0.	*	1	1730	211	0.01	0.00	0.01	57.
1	0505	62	0.01	0.01	0.00	0.	*	1	1735	212	0.01	0.00	0.01	56.
1	0510	63	0.01	0.01	0.00	0.	*	1	1740	213	0.01	0.00	0.01	56.
1	0515	64	0.01	0.01	0.00	0.	*	1	1745	214	0.01	0.00	0.01	55.
1	0520	65	0.01	0.01	0.00	0.	*	1	1750	215	0.01	0.00	0.01	54.
1	0525	66	0.01	0.01	0.00	0.	*	1	1755	216	0.01	0.00	0.01	54.
1	0530	67	0.01	0.01	0.00	0.	*	1	1800	217	0.01	0.00	0.01	53.
1	0535	68	0.01	0.01	0.00	0.	*	1	1805	218	0.01	0.00	0.01	53.
1	0540	69	0.01	0.01	0.00	0.	*	1	1810	219	0.01	0.00	0.01	52.
1	0545	70	0.01	0.01	0.00	0.	*	1	1815	220	0.01	0.00	0.00	51.
1	0550	71	0.01	0.01	0.00	0.	*	1	1820	221	0.01	0.00	0.00	51.
1	0555	72	0.01	0.01	0.00	0.	*	1	1825	222	0.01	0.00	0.00	50.
1	0600	73	0.01	0.01	0.00	0.	*	1	1830	223	0.01	0.00	0.00	49.
1	0605	74	0.01	0.01	0.00	0.	*	1	1835	224	0.01	0.00	0.00	48.
1	0610	75	0.01	0.01	0.00	0.	*	1	1840	225	0.01	0.00	0.00	47.
1	0615	76	0.01	0.01	0.00	0.	*	1	1845	226	0.01	0.00	0.00	46.
1	0620	77	0.01	0.01	0.00	0.	*	1	1850	227	0.01	0.00	0.00	45.
1	0625	78	0.01	0.01	0.00	0.	*	1	1855	228	0.01	0.00	0.00	43.
1	0630	79	0.01	0.01	0.00	0.	*	1	1900	229	0.01	0.00	0.00	42.
1	0635	80	0.01	0.01	0.00	0.	*	1	1905	230	0.01	0.00	0.00	41.
1	0640	81	0.01	0.01	0.00	o.	*	1	1910	231	0.01	0.00	0.00	41.
1	0645	82	0.01	0.01	0.00	0.	*	1	1915	232	0.01	0.00	0.00	40.
1	0650	83	0.01	0.01	0.00	0.	*	1		233	0.01	0.00	0.00	39.
•	3020	J.J	2.0.	2.01		~·		•	.,_0		J. J.	- • - • •		

1	0655	84	0.01	0.01	0.00	0.	*	1	1925	234	0.01	0.00	0.00	38.
1	0700	85	0.01	0.01	0.00	0.	*	1	1930	235	0.01	0.00	0.00	38.
1	0705	86	0.01	0.01	0.00	1.	*	1	1935	236	0.01	0.00	0.00	37.
1	0710	87	0.01	0.01	0.00	1.	*	1	1940	237	0.00	0.00	0.00	37.
1	0715	88	0.01	0.01	0.00	1.	*	1	1945	238	0.00	0.00	0.00	36.
1	0720	89	0.01	0.01	0.00	1.	*	1	1950	239	0.00	0.00	0.00	36.
1	0725	90	0.01	0.01	0.00	2.	*	1	1955	240	0.00	0.00	0.00	35.
1	0730	91	0.01	0.01	0.00	2.	*	1	2000	241	0.00	0.00	0.00	35.
1	0735	92	0.01	0.01	0.00	2.	*	1	2005	242	0.00	0.00	0.00	35.
1	0740	93	0.01	0.01	0.00	3.	*	1	2010	243	0.00	0.00	0.00	34.
1	0745	94	0.01	0.01	0.00	3.	*	1	2015	244	0.00	0.00	0.00	34.
1	0750	95	0.01	0.01	0.00	4.	*	1	2020	245	0.00	0.00	0.00	34.
1	0755	96	0.01	0.01	0.00	4.	*	1	2025	246	0.00	0.00	0.00	33.
1	0800	97	0.01	0.01	0.00	5.	*	1	2030	247	0.00	0.00	0.00	33.
1	0805	98	0.01	0.01	0.00	5.	*	1	2035	248	0.00	0.00	0.00	33.
1	0810	99	0.01	0.01	0.00	6.	*	1	2040	249	0.00	0.00	0.00	32.
i	0815	100	0.01	0.01	0.00	6.	*	1	2045	250	0.00	0.00	0.00	32.
1	0820	101	0.01	0.01	0.00	7.	*	1	2050	251	0.00	0.00	0.00	32.
1	0825	102	0.01	0.01	0.00	7.	*	1	2055	252	0.00	0.00	0.00	32.
1	0830	103	0.01	0.01	0.00	8.	*	1	2100	253	0.00	0.00	0.00	31.
1	0835	104	0.01	0.01	0.00	9.	*	1	2105	254	0.00	0.00	0.00	31.
1	0840	105	0.01	0.01	0.00	9.	*	1	2110	255	0.00	0.00	0.00	31.
1	0845	106	0.01	0.01	0.00	10.	*	1	2115	256	0.00	0.00	0.00	31.
1	0850	107	0.01	0.01	0.00	11.	*	1	2120	257	0.00	0.00	0.00	30.
	0855	108		0.01	0.00	11.	*	1	2125	258	0.00	0.00	0.00	30.
1	0900	109	0.01	0.01	0.00	12.	*	1	2130	259	0.00	0.00	0.00	30.
1		110	0.01	0.01	0.00	13.	*	1	2135	260	0.00	0.00	0.00	30.
1	0905		0.01				*			261	0.00	0.00	0.00	30.
1	0910	111	0.01	0.01	0.00	14.	*	1	2140	262		0.00	0.00	29.
1	0915	112	0.01	0.01	0.00	14.	*	1	2145		0.00	0.00	0.00	29.
1	0920	113	0.01	0.01	0.00	15.	*	1	2150	263	0.00		0.00	29.
1	0925	114	0.01	0.01	0.00	16.	*	1	2155	264	0.00	0.00		29.
1	0930	115	0.01	0.01	0.00	16.	*	1	2200	265	0.00	0.00	0.00 0.00	29.
1	0935	116	0.01	0.01	0.00	17.	*	1	2205	266	0.00	0.00		
1	0940	117	0.01	0.01	0.00	17.		1	2210	267	0.00	0.00	0.00	28.
1	0945	118	0.01	0.01	0.00	18.		1	2215	268	0.00	0.00	0.00	28.
1	0950	119	0.01	0.01	0.00	18.	*	1	2220	269	0.00	0.00	0.00	28.
1	0955	120	0.01	0.01	0.00	19.		1	2225	270	0.00	0.00	0.00	28.
1	1000	121	0.01	0.01	0.00	19.	*	1	2230	271	0.00	0.00	0.00	28.
1	1005	122	0.01	0.01	0.00	20.	*	1	2235	272	0.00	0.00	0.00	28.
1	1010	123	0.01	0.01	0.00	21.	*	1	2240	273	0.00	0.00	0.00	27. 27
1	1015	124	0.01	0.01	0.00	21.	*	1	2245	274	0.00	0.00	0.00	27.
1	1020	125	0.01	0.01	0.00	22.	*	1	2250	275	0.00	0.00	0.00	27.
1	1025	126	0.01	0.01	0.01	23.	*	1	2255	276	0.00	0.00	0.00	27.
1	1030	127	0.01	0.01	0.01	24.	* .	1	2300	277	0.00	0.00	0.00	27.
1	1035	128	0.01	0.01	0.01	25.	*	1	2305	278	0.00	0.00	0.00	27.
1	1040	129	0.02	0.01	0.01	26.	*	1	2310	279	0.00	0.00	0.00	26.
1	1045	130	0.02	0.01	0.01	28.	*	1	2315	280	0.00	0.00	0.00	26.
1	1050	131	0.02	0.01	0.01	29.	*	1	2320	281	0.00	0.00	0.00	26.
1	1055	132	0.02	0.01	0.01	30.	*	1	2325	282	0.00	0.00	0.00	26.
1	1100	133	0.02	0.01	0.01	32.	*	1	2330	283	0.00	0.00	0.00	26.
1	1105	134	0.02	0.01	0.01	34.	*	1	2335	284	0.00	0.00	0.00	26.
1	1110	135	0.02	0.01	0.01	36.	*	1	2340	285	0.00	0.00	0.00	26.
1	1115	136	0.02	0.01	0.01	38.	*	1	2345	286	0.00	0.00	0.00	25.
1	1120	137	0.02	0.01	0.01	40.	*	1	2350	287	0.00	0.00	0.00	25.
1	1125	138	0.02	0.01	0.01	42.	*	1	2355	288	0.00	0.00	0.00	25.
1	1130	139	0.03	0.01	0.01	44.	*	2	0000	289	0.00	0.00	0.00	25.
1	1135	140	0.05	0.02	0.02	47.	*	2	0005	290	0.00	0.00	0.00	25.
1	1140	141	0.05	0.03	0.03	50.	*	2	0010	291	0.00	0.00	0.00	25.
1	1145	142	0.06	0.03	0.03	55.	*	2	0015	292	0.00	0.00	0.00	24.
1	1150	143	0.10	0.04	0.05	61.	*	2	0020	293	0.00	0.00	0.00	23.

1	1155	144	0.12	0.05	0.07	71.	*	2	0025	294	0.00	0.00	0.00	22.
1	1200	145	0.26	0.09	0.17	86.	*	2	0030	295	0.00	0.00	0.00	21.
1	1205	146	0.43	0.12	0.31	112.	*	2	0035	296	0.00	0.00	0.00	19.
1	1210	147	0.18	0.04	0.14	151.	*	2	0040	297	0.00	0.00	0.00	18.
1	1215	148	0.11	0.02	0.08	200.	*	2	0045	298	0.00	0.00	0.00	16.
1	1220	149	0.07	0.01	0.05	261.	*	2	0050	299	0.00	0.00	0.00	14.
1	1225	150	0.06	0.01	0.05	332.	*	2	0055	300	0.00	0.00	0.00	12.
							*							

TOTAL RAINFALL = 3.70, TOTAL LOSS = 1.51, TOTAL EXCESS = 2.19

PEAK FLOW	TIME					
(CFS)	(HR)		6-HR	24-HR	72-HR	24.92-HR
564.	12.83	(CFS)	172.	56.	54.	54.
		(INCHES)	1.665	2.177	2.177	2.177
		(AC-FT)	85.	111.	111.	111.

CUMULATIVE AREA = 0.96 SQ MI

RUNOFF SUMMARY FLOW IN CUBIC FEET PER SECOND TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE 6-HOUR	FLOW FOR MAXIM 24-HOUR	NUM PERIOD 72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	BOTTOM	564.	12.83	172.	56.	54.	0.96		

*** NORMAL END OF HEC-1 ***

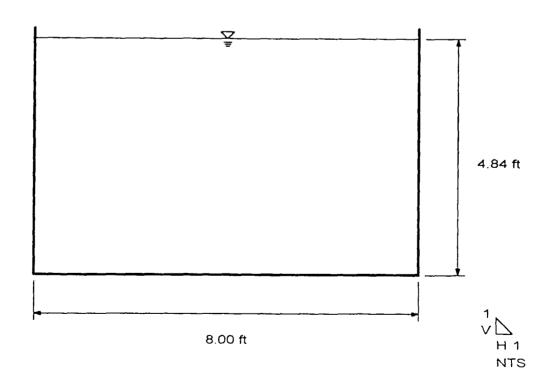
APPENDIX B

FlowMasterTM Output

Culvert under Highway 111 Cross Section for Rectangular Channel

Project Description	on .
Project File	p:\transjo\flomodel\h-40\culvert.fm2
Worksheet	CULVERT UPSTREAM OF TRANSJORDAN LANDFILL
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.0057	00 ft/ft
Depth	4.84	ft
Bottom Width	8.00	ft
Discharge	564.00	cfs



Culvert under Highway 111 Worksheet for Rectangular Channel

Project Description	on
Project File	p:\transjo\flomodel\h-40\culvert.fm2
Worksheet	CULVERT UPSTREAM OF TRANSJORDAN LANDFILL
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.0057	00 ft/ft
Bottom Width	8.00	ft
Discharge	564.00	cfs

D		
Results		
Depth	4.84	ft
Flow Area	38.75	ft²
Wetted Perimeter	17.69	ft
Top Width	8.00	ft
Critical Depth	5.37	ft
Critical Slope	0.0043	74 ft/ft
Velocity	14.56	ft/s
Velocity Head	3.29	ft
Specific Energy	8.14	ft
Froude Number	0.00	

Section 35 Normal Flow Worksheet for Irregular Channel

Project Description	on
Project File	p:\transjo\flomodel\h-40\critsecs.fm2
Worksheet	Section 35
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope	0.02350	00 ft/ft		
Elevation range: 5	,004.00 ft to 5,012.0	00 ft.		
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
1,031.18	5,012.00	1,031.18	1,063.78	0.070
1,043.04	5,010.00	1,063.78	1,121.56	0.050
1,054.38	5,008.00	1,121.56	1,224.50	0.070
1,063.78	5,006.00			
1,071.91	5,004.00			
1,105.82	5,004.00			
1,121.56	5,006.00			
1,137.85	5,008.00			
1,179.45	5,010.00			
1,224.50	5,012.00			
Discharge	564.00	cfs		

Results		
Wtd. Mannings Coefficient	0.050	
Water Surface Elevation	5,006.00	ft
Flow Area	91.48	ft ²
Wetted Perimeter	58.10	ft
Top Width	57.74	ft
Height	2.00	ft
Critical Depth	5,005.83	ft
Critical Slope	0.032291	ft/ft
Velocity	6.17	ft/s
Velocity Head	0.59	ft
Specific Energy	5,006.59	ft
Froude Number	0.86	
Flow is subcritical.		

Section 55 Normal Flow Worksheet for Irregular Channel

Project Descripti	on
Project File	p:\transjo\flomodel\h-40\critsecs.fm2
Worksheet	Section 55
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope	0.049900 ft/ft			
Elevation range: 5	,026.00 ft to 5,030.00 ft.			
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
1,042.86	5,030.00	1,042.86	1,054.22	0.070
1,054.22	5,028.00	1,054.22	1,120.64	0.050
1,063.84	5,026.00	1,120.64	1,137.10	0.070
1,103.51	5,026.00			
1,120.64	5,028.00			
1,137.10	5,030.00			
Discharge	564.00 cfs			

Results		
Wtd. Mannings Coefficient	0.050	
Water Surface Elevation	5,027.49	ft
Flow Area	73.83	ft²
Wetted Perimeter	59.81	ft
Top Width	59.57	ft
Height	1.49	ft
Critical Depth	5,027.67	ft
Critical Slope	0.032992	ft/ft
Velocity	7.64	ft/s
Velocity Head	0.91	ft
Specific Energy	5,028.39	ft
Froude Number	1.21	
Flow is supercritical.		

Section 65 Normal Flow Worksheet for Irregular Channel

Project Description	on
Project File	p:\transjo\flomodel\h-40\critsecs.fm2
Worksheet	Section 65
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope	0.021800	ft/ft		
Elevation range: 5	,032.00 ft to 5,036.00	ft.		
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
1,042.12	5,036.00	1,042.12	1,048.36	0.050
1,048.36	5,034.00	1,048.36	1,076.74	0.070
1,054.49	5,032.00	1,076.74	1,083.28	0.050
1,070.19	5,032.00			
1,076.74	5,034.00			
1,083.28	5,036.00			
Discharge	564.00	cfs		

Results		
Wtd. Mannings Coefficient	0.063	
Water Surface Elevation	5,035.43	ft
Flow Area	91.17	ft²
Wetted Perimeter	38.57	ft
Top Width	37.51	ft
Height	3.43	ft
Critical Depth	5,034.81	ft
Critical Slope	0.049813	ft/ft
Velocity	6.19	ft/s
Velocity Head	0.59	ft
Specific Energy	5,036.02	ft
Froude Number	0.70	
Flow is subcritical.		

Section 85 Normal Flow Worksheet for Irregular Channel

Project Description	on
Project File	p:\transjo\flomodel\h-40\critsecs.fm2
Worksheet	Section 85
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope	0.022000 ft/ft			
Elevation range: 5	,044.00 ft to 5,048.00 ft.			
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
1,020.29	5,048.00	1,020.29	1,025.34	0.050
1,025.34	5,046.00	1,025.34	1,064.17	0.070
1,030.39	5,044.00	1,064.17	1,072.94	0.050
1,055.46	5,044.00			
1,064.17	5,046.00			
1,072.94	5,048.00			
Discharge	564.00 cfs			

Results		
Wtd. Mannings Coefficient	0.066	
Water Surface Elevation	5,046.86	ft
Flow Area	99.67	fţ2
Wetted Perimeter	45.61	ft
Top Width	44.75	ft
Height	2.86	ft
Critical Depth	5,046.25	ft
Critical Slope	0.056854	ft/ft
Velocity	5.66	ft/s
Velocity Head	0.50	ft
Specific Energy	5,047.35	ft
Froude Number	0.67	
Flow is subcritical.		

Section 105 Normal Flow Worksheet for Irregular Channel

Project Descripti	on
Project File	p:\transjo\flomodel\h-40\critsecs.fm2
Worksheet	Section 105
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data		 		
Channel Slope	0.030100 ft/ft			
Elevation range: 5	,060.00 ft to 5,064.00 ft.			
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
1,025.64	5,064.00	1,025.64	1,031.81	0.070
1,031.81	5,062.00	1,031.81	1,075.66	0.050
1,038.14	5,060.00	1,075.66	1,083.65	0.070
1,067.98	5,060.00			
1,075.66	5,062.00			
1,083.65	5,064.00			
Discharge	564.00 cfs			

Results		
Wtd. Mannings Coefficient	0.050	
Water Surface Elevation	5,062.07	ft
Flow Area	76.88	ft²
Wetted Perimeter	44.95	ft
Top Width	44.36	ft
Height	2.07	ft
Critical Depth	5,062.05	ft
Critical Slope	0.031179	ft/ft
Velocity	7.34	ft/s
Velocity Head	0.84	ft
Specific Energy	5,062.91	ft
Froude Number	0.98	
Flow is subcritical.		

Section 160 Normal Flow Worksheet for Irregular Channel

Project Description	on
Project File	p:\transjo\flomodel\h-40\critsecs.fm2
Worksheet	Section 160
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope	0.026500 ft/ft			
Elevation range: 5	,108.00 ft to 5,112.00 ft.			
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
1,117.84	5,112.00	1,117.84	1,125.63	0.070
1,125.63	5,110.00	1,125.63	1,212.74	0.050
1,134.58	5,108.00	1,212.74	1,277.76	0.070
1,205.06	5,108.00			
1,212.74	5,110.00			
1,277.76	5,112.00			
Discharge	564.00 cfs			

Results		
Wtd. Mannings Coefficient	0.050	
Water Surface Elevation	5,109.33	ft
Flow Area	101.21	ft²
Wetted Perimeter	81.87	ft
Top Width	81.55	ft
Height	1.33	ft
Critical Depth	5,109.23	ft
Critical Slope	0.034945	ft/ft
Velocity	5.57	ft/s
Velocity Head	0.48	ft
Specific Energy	5,109.81	ft
Froude Number	0.88	
Flow is subcritical.		

APPENDIX C HEC-2 Input and Output

```
09816-010-153
Т1
Τ2
        Trans Jordan Landfill Flow Model
        Bingham Creek 100-year Flood
Т3
        Flow 1 (564 cfs) is for watershed below Kennecott Dam.
T4
                                                             564 4984.85
     -10
      - 1
                                                               -6
                      - 1
    0.07
            0.07
                    0.05
                             0.1
                                      0.3
NC
              10 1034.48 1095.13
X1
       5
                                                             4984
                                                                    4984
X3
       0
                    4986 1017.19
    4988
            1000
                                     4984 1034.48
                                                     4982 1059.1
                                                                    4982 1069.9
GR
                                                                    4992 1193.14
GR
    4984 1095.13
                    4986 1122.66
                                     4988 1149.77
                                                    4990 1175.31
              14 1078.23 1116.34 219.89 231.68 222.84
X1
      10
   4994
            1000
                    4992 1026.06
                                    4990 1055.02
                                                    4988 1066.26
                                                                    4986 1078.23
GR
                                                    4988 1125.56
                                                                    4990 1148,13
                    4984 1107.07
                                     4986 1116.34
GR
    4984 1088.05
GR
    4992 1171-46
                    4994 1190.04
                                     4996 1209.22
                                                    4998 1228.72
              13 1156.74 1214.63
                                  177.58 175.25
                                                    180 3
      15
X1
                    4998 1038.31
                                                                    4992 1148.61
                                     4996 1090.14
                                                    4994 1141.54
  5000
GR
            1000
   4990 1156.74
                    4988 1177.65
                                     4988 1202.5
                                                    4990 1214.63
                                                                    4992 1224,18
GR
GR
   4994 1243.24
                    4996 1268.45
                                     4998 1312.11
      25
              15 1052.29 1108.87 412.39 410.21 409.97
X1
                                     5004 1019.43
    5008
            1000
                    5006 1010.75
                                                    5002 1027.61
                                                                    5000 1035.86
GR
                    4996 1052.29
                                     4994 1060.7
                                                     4994 1097.13
                                                                    4996 1108.87
    4998 1044.11
GR
                    5000 1127,71
                                     5002 1153.04
                                                    5004 1181.51
                                                                    5006 1201.44
   4008 1110 18
GR
              13 1063.78 1121.56 410.82 443.86 425.59
X1
      35
                    5014 1015.78
                                    5012 1031.18
                                                    5010 1043.04
                                                                    5008 1054.38
   5016
            1000
GR
                    5004 1071.91
                                     5004 1105.82
                                                    5006 1121.56
                                                                    5008 1137.85
   5006 1063.78
GR
                                     5014 1275.02
                    5012 1224.5
GR
    5010 1179.45
              17 1086.63 1131.4
                                  476.88 451.48 472.93
X1
     45
                                                                    5020 1041.82
GR 5028
            1000
                    5026 1007.01
                                     5024 1013.82
                                                    5022 1024.17
                            1074
                                     5014 1086.63
                                                    5012 1099.13
                                                                    5012 1116.89
    5018 1058.32
                    5016
                                                                    5022 1220.01
    014 1131.4
                    5016 1145.45
                                     5018 1159.59
                                                    5020 1173.72
ык 5024 1287.88
                    5026 1305.32
              15 1136.31 1184.27 213.98 223.65 219.51
      รก
X1
                                     5028 1044.16
                                                     5026 1069.12
                                                                    5022 1116.83
    5034
            1000
                    5030 1025.93
GR
                    5018 1136.31
                                     5016 1147.34
                                                     5016 1170.02
                                                                    5018 1184.27
    5020 1126.21
GR
                                                                    5028 1327.33
                    5022 1216.55
                                     5024 1232.67
                                                     5026 1266.57
   5020 1200.19
GR
              10 1054.22 1120.64 190.09 213.62 200.39
Х1
      55
   5034
            1000
                    5032 1023.22
                                     5030 1042.86
                                                     5028 1054.22
                                                                    5026 1063.84
GR
   5026 1103.51
                    5028 1120.64
                                     5030 1137.1
                                                     5032 1154.08
                                                                    5034 1220.93
GR
                 1063.5 1096.5 208.89 201.36 205.75
X1
      60
              19
                                                                    5042 1027.77
                                                    5044 1020.62
    5050
            1000
                    5048 1006.85
                                     5046 1013.71
GR
                    5038 1041.75
                                     5036 1048.99
                                                     5034 1056.12
                                                                    5032 1063.5
    5040 1034.81
GR
                    5030 1071.7
                                     5030 1089.68
                                                    5032 1096.5
                                                                     5034 1103.37
    5030 1070.64
GR
                    5038 1117.24
                                                    5042 1148.53
                                     5040 1125.65
GR
   5036 1110.29
      65
              19 1048.36 1076.74
                                   86.03 92.75
                                                    91.56
x1
                                                                     5042 1023.91
                    5048 1005.88
                                     5046 1011.95
                                                     5044 1017.94
    5050
            1000
GR
                                                     5034 1048.36
                                                                     5032 1054.49
                                     5036 1042.12
    5040 1029.88
                    5038
                            1036
GR
    5032 1070.19
                    5034 1076.74
                                     5036 1083.28
                                                     5038 1089.88
                                                                     5040 1096.39
GR
                                                     5048 1138.31
                    5044 1109.5
                                     5046 1116.42
    5042 1102.99
CR
              15 1030.87 1058.21 177.59 172.22 173.88
Х1
      70
                                                                     5042 1020.47
    5050
            1000
                    5048 1005.09
                                     5046 1010.09
                                                     5044 1015.31
GR
                    5038 1030.87
                                     5036 1036.07
                                                     5036 1053.16
                                                                     5038 1058.21
    5040 1025.67
GR
                                                     5046 1078.64
                                                                     5048 1091.23
                    5042 1068.33
                                     5044 1073.34
GR
    5040 1063.27
                                  196.99 186.64 191.87
      75
              13 1026.5 1069.74
X1
                    5050 1005.78
                                     5048 1011.32
                                                     5046 1016.68
                                                                     5044 1021.8
   5052
            1000
GR
                    5038 1035.79
                                     5038 1061.26
                                                     5040 1069.74
                                                                     5042 1078.78
     042 1026.5
                                     5048 1127.66
    5044 1088.83
                    5046 1099,37
              13 1033.96 1083.08
                                   130.7 111.7
                                                    120.2
      80
х1
                                                                     5046 1022.44
                    5052 1005.62
                                     5050 1011.23
                                                     5048 1016.83
            1000
GR 5054
                                                                    5042 1083.08
                                     5040 1039.54
                                                     5040 1070.98
GR 5044 1028.11
                    5042 1033.96
```

				1104.48						
X1	85					179.86				4000 ==
GR	5056			1005.07		1010.2				
GR						1055.46	5046	1064.17	5048	1072.94
		1081.59		1094.95						
	90					141.22				
	5062	1000		1005.59		1011.24				1022.41
	5052	1028				1039.23			5050	1074.82
GR	5052			1089.28		1096.58				
X1	95	13	1025.81	1056.24		191.2				
	5064	1000		1004.86		1010.04				
GR	5054	1025.81	5052	1031.01	5052	1049.23	5054	1056.24	5056	1063.11
GR	5058	1070.2	5060	1077.43	5062	1084.56				
X1	100	13	1027.95	1052.53	176.72	186.35	182.94			
GR	5066	1000	5064	1005.63	5062	1011.2	5060	1016.67	5058	1022.39
GR	5056	1027.95	5054	1033.53	5054	1044.96	5056	1052.53	5058	1059.07
GR	5060	1065.54	5062	1072.2	5064	1078.69				
X1	105	13				200.83				
GR	5072	1000	_			1012.9				
GR						1067.98	5062	1075.66	5064	1083.65
GR	5066	1091.27	5068	1098.97	5070	1128.68				
X1	110	11	1025.05	1050.2	204.82	193.74	196.24			
GR	5074	1000	5072	1006.4	5070	1012.59	5068	1018.86	5066	1025.05
GR	5064	1031.23	5064	1043.38	50 66	1050.2	5068	1057.32	5070	1063.73
GR	5072	1069.66				,				
X1	115	13				210.91				
GR	5080	1000				1017.23				1032.52
GR	5070	1039.44	5068	1046.29	5068	1065.81	5070	1074.36	5072	1082.92
GR	5074	1091.7	5076	1100.47	5078	1142.59				
	120	10	1018.35	1108.16	254.39	250.51	251.79			
	-080	1000	5078	1009.24	5076	1018.35	5074	1028.28	5074	1098.9
uĸ	5076	1108.16	5078	1117.45	5080	1142.28	5082	1171.64	5084	1200.94
X1	125	11	1013.6	1120.77	188.27	176.43	180.4			
GR	5084	1000	5082	1006.95	50 80	1013.6	5078	1020.46	5078	1109
GR	5080	1120.77	5082	1179.86	5084	1204.71	5086	1230.11	5088	1255.91
GR	5090	1284.13								
X1	130	11	1009.28	1121.19	161.42	176.74	167.86			
GR	5086	1000	5084	1009.28	5082	1021.96	5082	1111.65	5084	1121.19
GR	5086	1190.7	5088	1238.5	5090	1265.26	5092	1291.85	5094	1318.62
GR	5096	1344.95								
X1	135	13	1025.73	1116.56	224.84	212.2	220.83			
GR	5092	1000	5090	1016.56	5088	1025.73	5086	1035.03	5086	1106.81
GR	5088	1116.56	5090	1164.93	5092	1253.25	5094	1301.12	5096	1338.85
GR	5098	1365.45	5100	1392	5102	1421.55				
X1	140	13	1143.99	1232.2	258.11	231.45	244.12			
GR	5098	1000	5096	1037.96	5094	1089.33	5092	1143.99	5090	1163.22
GR	5090	1222.81	5092	1232.2	5094	1245.69	5096	1352.47	5098	1413.09
GR	5100	1464.82	5102	1500.88	5104	1534.16				
X1	145	16	1251.62	1325.51	231.61	231.4	231.28			•
GR	5106	1000	5104	1023.87	5102	1051.17	5100	1103.1	5098	1193.64
GR	5096	1251.62	5094	1260.71	5094	1316.25	5096	1325.51	5098	1342.29
GR		1409.28				1521.2				1597.58
GR	5110	1632.56								
х1	150	14	1169.72	1239.09	331.54	320.57	324.16			
GR	5110	1000	5108	1023.78	5106	1050.02	5104	1135.97	5102	1169.72
		1178.31				1239.09	5104	1338.87	5106	1409.85
		1448.15				1501.68				
X1	155					196.61				
GR	5114	1000		1032.9				1103.07	5106	1111.25
		1119.37				1182.31	5104	1192.4	5106	1224.79
		-	-	-						

GR	5108	1330.23	5110	1354.7	5112	1376.71	5114	1398.75	5116	1419.66
GR	5118	1438.32								
X1	160	15	1125.63	1212.74	217.32	240.78	226.03			
GR	5120	1000	5118	1031.75	5116	1084.8	5114	1109.87	5112	1116.33
	112	1117.84	5110	1125.63	5108	1134.58	5108	1205.06	5110	1212.74
	5112	1277.76	5114	1343.23	5116	1396.94	5118	1439.49	5120	1481.87
х1	165	13	1084.45	1133.5	128.21	114.24	117.9			
GR	5122	1000	5120	1016.2	5118	1054.55	5116	1072.46	5114	1078.47
GR	5112	1084.45	5110	1091.06	5110	1127.66	5112	1133.5	5114	1139.01
GR	5116	1275.56	5118	1367.51	5120	1418.31				
EJ										

PROJECT TITLE : Trans Jordan Landfill Flow Model

PROJECT NUMBER: 09816-010-153

PAGE 1

4/10/1996

BOSS HEC-2 for AutoCAD (tm)

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Version

Serial Number: 20859

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PROGRAM ORIGIN : ------

BOSS HEC-2 for AutoCAD is an enhanced version of the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-2 program for water-surface profile computations. Program based upon the September 1990 version. updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : Trans Jordan Landfill Flow Model

PROJECT NUMBER: 09816-010-153

DESCRIPTION : Bingham Creek 100-year Flood

IGINEER : Roland Springer DATE OF RUN : 4/10/1996 TIME OF RUN : 9:12 am

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PROJECT TITLE : Trans Jordan Landfill Flow Model

PROJECT NUMBER : 09816-010-153

4/10/1996

T1 09816-010-153

- T2 Trans Jordan Landfill Flow Model
- T3 Bingham Creek 100-year Flood

T4 Flow 1 (564 cfs) is for watershed below Kennecott Dam.

JOB PARAMETERS :

......

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	- 10	2						564	4984.85	
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	I BW	CHNIM	ITRACE
	- 1		-1					-6		

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV)

.100

.pansion Coefficient (CEHV)

.300

STATUS: Analyzing cross-section reach 5.000.

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PROJECT TITLE : Trans Jordan Landfill Flow Model

PROJECT NUMBER : 09816-010-153

4/10/1996

Cross	Left	Channel	Right	Flow	Water	Critical	Known
Section	Overbank	Manning	0verbank	Depth	Surface	W. S.	W. S.
Number	Manning	n	Manning		Elevation	Elevation	Elevation
SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
				(ft)	(ft MSL)	(ft MSL)	(ft MSL)
Energy	Left	Channel	Right	Energy	Weighted	Friction	Other
Gradient	0verbank	Length	0verbank	Gradient	Velocity	Energy	Energy
	Length		Length	Elevation	Head	Loss	Loss
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
(ft/ft)	(ft)	(ft)	(ft)	(ft MSL)	(ft)	(ft)	(ft)
						•••••	• • • • • • • • • • • • • • • • • • • •
Cummul-	Left	Channel	Right	Bridge	Left	Right	Number of
ative	0verbank	Area	Overbank	Deck	Bank	Bank	Balance
Volume	Area		Area	Area	Elevation	Elevation	Trials
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
(acre-ft)	(sq ft)	(sq ft)	(sq ft)	(sq ft)	(ft MSL)	(ft MSL)	
T-4-1	1 - 4 4	01 -1					
Total	Left	Channel	Right	Computed	Left	Right	Number of
Flow	0verbank	Flow	Overbank	W. S.	W. S.	W. S.	Crit Dpth
•	Flow		Flow	Top Width		Station	Trials
Q ,	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	
Flow	Left	Channel	Right	Length	Cummul.	Minimum	Number of
Travel	Overbank	Mean	Overbank	Weighted	Surface	C. S.	Other
Time	Velocity	Velocity	Velocity	Manning n		Elevation	
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
(hrs)	(ft/s)	(ft/s)	(ft/s)		(acres)	(ft MSL)	TOON
5.000	.070	.050	.070	2.85	4984.85	.00	4984.85
.009002	0	0	0	4985.16	.31	.00	.00
.00	3	123	4	.00	4984.00	4984.00	0
564	3	554	5	79.7	1027.13	1106.83	0
.00	1.13	4.51	1.14	.000	.0	4982.00	0
STAT	US: Analyz	ing cross-	section re	each 10.000	١.		
10.000	.070	.050	.070	2.98	4986.98	.00	.00
.011816	219	222	231	4987.52	.53	2.29	.07
.59	2	94	2	.00	4986.00	4986.00	2
564	4	556	3	48.5	1072.34	1120.88	0
.01	1.43	5.88	1.42	.000	.3	4984.00	0

STATUS: Analyzing cross-section reach 15.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

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PROJECT TITLE : Trans Jordan Landfill Flow Model

PROJECT NUMBER : 09816-010-153

4/10/1996

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	I CONT
•••••					• • • • • • • • • • • • • • • • • • • •		
15.000	.070	.050	.070	2.06	4990.06	4990.00	.00
.028844	177	180	175	4990.72	.67	3.17	.04
.98	0	86	0	.00	4990.00	4990.00	7
564	0	563	0	58.4	1156.51	1214.90	14
.02	.04	6.55	.04	.000	.6	4988.00	0

STATUS: Analyzing cross-section reach 25.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

opstream to Downstream Conveyance Ratio (KRAIIU)									
25.000	.070	.050	.070	2.49	4996.49	.00	.00		
.008992	412	409	410	4996.83	.34	6.07	.03		
1.96	0	120	0	.00	4996.00	4996.00	5		
564	0	563	0	61.1	1050.27	1111.42	0		
.04	.78	4.66	.78	.000	1.1	4994.00	0		

STATUS: Analyzing cross-section reach 35.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

35.000	.000	.050	.000	1.82	5005.82	5005.82	.00
.032755	410	425	443	5006.56	.74	6.59	.12
2.95	0	81	0	.00	5006.00	5006.00	8
564	0	563	0	55.7	1064.50	1120.16	15
.06	.00	6.91	.00	.000	1.7	5004.00	0

STATUS: Analyzing cross-section reach 45.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.6										
45.000	.070	.050	.070	2.85	5014.85	.00	.00			
.011833	476	472	451	5015.32	.47	8.73	.03			
3.97	2	100	2	.00	5014.00	5014.00	7			
564	3	557	3	56.2	1081.23	1137,41	0			
.08	1.30	5.53	1.30	.000	2.3	5012.00	0			

STATUS: Analyzing cross-section reach 50.000.

PROJECT TITLE : Trans Jordan Landfill Flow Model

PROJECT NUMBER : 09816-010-153

4/10/1996

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	OCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
•••••				•	•••••		
50.000	.070	.050	.070	2.29	5018.29	.00	.00
.024045	213	219	223	5018.98	.69	3.59	.07
4.45	0	84	0	.00	5018.00	5018.00	4
564	0	563	0	51.7	1134.87	1186.54	0
.09	.89	6.68	.89	.000	2.6	5016.00	0

STATUS: Analyzing cross-section reach 55,000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

.00	5027.67	5027.67	1.67	.000	.050	.000	55.000
.00	5.62	.69	5028.36	213	200	190	.033126
2	5028.00	5028.00	.00	0	84	0	4.84
15	1117.80	1055.81	62.0	0	563	0	564
0	5026.00	2.8	.000	.00	6.65	.00	.10

STATUS: Analyzing cross-section reach 60.000.

.00	.00	5032.76	2.76	.070	.050	.070	60.000
.04	5.18	.82	5033.58	201	205	208	.019782
5	5032.00	5032.00	.00	0	77	1	5.22
0	1099.11	1060.70	38.4	1	560	1	564
0	5030.00	3.1	.000	1.52	7.28	1.53	.11

STATUS: Analyzing cross-section reach 65.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

.00	5034.77	5034.77	2.77	.070	.050	.070	65.000
.09	2.11	1.11	5035.89	92	91	86	.027194
2	5034.00	5034.00	.00	0	66	0	5.38
5	1079.27	1045.94	33.3	1	560	1	564
n	5032 00	3 1	. 000	1.81	8.49	1.80	.11

STATUS: Analyzing cross-section reach 70.000.

PROJECT TITLE : Trans Jordan Landfill Flow Model

PROJECT NUMBER : 09816-010-153

4/10/1996

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	1 CONT
						••••	
70.000	.070	.050	.070	2.99	5038.99	.00	.00
.019971	177	173	172	5039.93	.94	4.03	.02
5.66	1	71	1	.00	5038.00	5038.00	3
564	2	559	2	32.4	1028.30	1060.71	0
.12	1.79	7.83	1.79	.000	3.3	5036.00	0

STATUS: Analyzing cross-section reach 75.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

	Upstrea	eam to Downstream Conveyance Ratio (KRATIO) 1.91							
75.000	.000	.050	.070	3.50	5041.50	.00	.00		
ი 05490	196	191	186	5041.81	.31	1.81	.06		
6.11	0	124	5	.00	5042.00	5040.00	4		
564	0	557	6	48.9	1027.66	1076.52	0		
.13	.00	4.47	1.28	.000	3.4	5038.00	0		

STATUS: Analyzing cross-section reach 80.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

	Upstream to Downstream Conveyance Ratio (KRATIO)									
80.000	.070	.050	.070	2.38	5042.38	.00	.00			
.014737	130	120	111	5042.88	.51	1.02	.06			
6.43	0	98	0	.00	5042.00	5042.00	2			
564	0	563	0	52.2	1032.88	1085.07	0			
.14	.81	5.71	.83	.000	3.6	5040.00	0			

STATUS: Analyzing cross-section reach 85.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

PROJECT TITLE : Trans Jordan Landfill Flow Model

PROJECT NUMBER : 09816-010-153

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SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
		•••••		••••		•••••	• • • • • • • • • • • • • • • • • • • •
85.000	.070	.050	.070	2.22	5046.22	5046.22	.00
.030349	181	182	179	5047.16			.13
6.78	0	72	0	.00			13
564	0	563	0	40.4			11
.14	.04	7.77	.84	.000			0
STA	rus: Analy:	zing cross	section re	each 90.000	o.		
90.000	.070	.050	.070	2.25	5050.25	.00	.00
.023469	148	144	141	5051.02	.77	3.84	.02
7.04	0	80	0	.00	5050.00	5050.00	3
564	0	563	0	42.9	1032.85	1075.76	0
.15	.03	7.03	.81	.000	3.9	5048.00	0
STAT	US: Analyz	ing cross-	section re	each 95.000).		
`5.000	.070	.050	.070	2.70	5054.70	5054.62	.00
.4650	189	191	191	5055.70	.99	4.61	.07
7.37	0	70	0	.00	5054.00		.07
564	0	561	1	34.6			8
.16	1.58	8.02	1.61	.000	4.1	5052.00	0
. 10	1.50	0.02	1.01	.000	٠, ١	3032.00	U

STATUS: Analyzing cross-section reach 100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)										
100.000	.070	.050	.070	3.86	5057.86	.00	.00			
.010387	176	182	186	5058.52	.66	2.79	.03			
7.72	4	81	5	.00	5056.00	5056.00	3			
564	9	543	11	35.8	1022.77	1058.62	0			
.16	1.98	6.64	2.00	.000	4.2	5054.00	0			

STATUS: Analyzing cross-section reach 105.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

PROJECT TITLE : Trans Jordan Landfill Flow Model

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SECNO SLOPE VOL Q TIME	XNL XLOBL ALOB QLOB VLOB	XNCH XLCH ACH QCH VCH	VROB	DEPTH EG CORAR TOPWD WTN			WSELK OLOSS ITRIAL IDC ICONT
			••••				
105.000	.000	.050	.000	2.03	5062.03	5062.03	.00
.031542	200	199	200	5062.91		3.34	
8.10	0	75	0	.00	5062.00	5062.00	3
564	0	563	0	44.1	1031.70	1075.80	
.17	.04	7.50	.04	.000	4.4	5060.00	0
STAT	TUS: Analyz	zing cross	section re	each 110.00	00.		
110.000	.070	.050	.070	3.13	5067.13	5067.05	.00
.022951	204	196	193	5068.22	1.08	5.25	.06
8.43	1	65	2	.00	5066.00	5066.00	7
564	4	554	4	32.7	1021.53	1054.24	14
.18	2.13	8.42	2.15	.000	4.6	5064.00	0

STATUS: Analyzing cross-section reach 115.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

.00	.00	5071.06	3.06	.070	.050	.070	115.000
. 05	3.36	.57	5071.63	210	208	209	.011877
3	5070.00	5070.00	.00	2	91	1	8.83
0	1078.90	1035.77	43.1	3	557	2	564
0	5068.00	4.8	.000	1.49	6.10	1.48	.19

STATUS: Analyzing cross-section reach 120.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

	10)	.69					
120.000	.000	.050	.000	1.35	5075.35	.00	.00
.024641	254	251	250	5075.81	.45	4.17	.01
9.40	0	104	0	.00	5076.00	5076.00	3
564	0	563	0	83.6	1021.55	1105.17	0
.20	.00	5.40	.00	.000	5.1	5074.00	0

STATUS: Analyzing cross-section reach 125.000.

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PROJECT TITLE : Trans Jordan Landfill Flow Model

PROJECT NUMBER : 09816-010-153

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SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	UCELY
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	WSELK OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
0	QLOB	OCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
		•••••					
125.000	.000	.050	.000	1.30	5079.30	.00	.00
.018313	188	180	176	5079.63	.33	3.81	.01
9.88	0	122	0	.00	5080.00	5080.00	4
564	0	563	0	100.6	1016.00	1116.65	0
.21	.00	4.59	.00	.000	5.5	5078.00	0
STA	TUS: Analyz	ing cross	section re	each 130.00	00.		
170 000	000	050					
130.000		.050	.000	1.11	5083.11	.00	.00
.030125	161 0	167	176	5083.55	.44	3.88	.03
564	0	106	0	.00	5084.00	5084.00	4
.22	.00	563 5.30	.00	102.0	1014.92 5.9	1116.95 5082.00	0
		7.50	100		,,,	3002.00	J
	TUS: Analyz NING: (3302	_				able range	
	Upstr	eam to Dow	nstream Co	nveyance R	atio (KRAT	10)	1.48
135.000	Upstr	eam to Dow	nstream Co .000	nveyance R	atio (KRAT 5087.59	.00	1.48
135.000 .013825				·		-	
	.000	.050	.000	1.59	5087.59	.00	.00
.013825	.000 224	.050 220	.000 212	1.59 5087.90	5087.59 .31	.00 4.34	.00
.013825 10.91	.000 224 0	.050 220 126	.000 212 0	1.59 5087.90 .00	5087.59 .31 5088.00	_00 4.34 5088.00	.00 .01 5
.013825 10.91 564 .23	.000 224 0 0	.050 220 126 563 4.47	.000 212 0 0	1.59 5087.90 .00 86.9 .000	5087.59 .31 5088.00 1027.63 6.4	.00 4.34 5088.00 1114.56	.00 .01 5
.013825 10.91 564 .23	.000 224 0 0 .00	.050 220 126 563 4.47	.000 212 0 0 .00	1.59 5087.90 .00 86.9 .000 ach 140.00	5087.59 .31 5088.00 1027.63 6.4	.00 4.34 5088.00 1114.56 5086.00	.00 .01 5 0
.013825 10.91 564 .23 STAT	.000 224 0 0 .00 .00	.050 220 126 563 4.47 ing cross-	.000 212 0 0 .00 section re	1.59 5087.90 .00 86.9 .000 ach 140.00	5087.59 .31 5088.00 1027.63 6.4 0.	.00 4.34 5088.00 1114.56 5086.00	.00 .01 5 0 0
.013825 10.91 564 .23 STAT 140.000 .020071	.000 224 0 0 .00 .00 TUS: Analyz .000 258	.050 220 126 563 4.47 ing cross-	.000 212 0 0 .00 section re	1.59 5087.90 .00 86.9 .000 ach 140.00	5087.59 .31 5088.00 1027.63 6.4 0.	.00 4.34 5088.00 1114.56 5086.00	.00 .01 5 0 0
.013825 10.91 564 .23 STAT 140.000 .020071 11.57	.000 224 0 0 .00 .00 .00 258	.050 220 126 563 4.47 ing cross- .050 244 110	.000 212 0 0 .00 section re .000 231	1.59 5087.90 .00 86.9 .000 ach 140.00 1.55 5091.96	5087.59 .31 5088.00 1027.63 6.4 0. 5091.55 .41 5092.00	.00 4.34 5088.00 1114.56 5086.00	.00 .01 5 0 0
.013825 10.91 564 .23 STAT 140.000 .020071	.000 224 0 0 .00 .00 TUS: Analyz .000 258	.050 220 126 563 4.47 ing cross-	.000 212 0 0 .00 section re	1.59 5087.90 .00 86.9 .000 ach 140.00	5087.59 .31 5088.00 1027.63 6.4 0.	.00 4.34 5088.00 1114.56 5086.00 .00 4.03 5092.00 1230.12	.00 .01 5 0 0
.013825 10.91 564 .23 STAT 140.000 .020071 11.57 564 .25	.000 224 0 0 .00 .00 .00 258 0	.050 220 126 563 4.47 ing cross- .050 244 110 563 5.12	.000 212 0 0 .00 section re .000 231 0 0	1.59 5087.90 .00 86.9 .000 ach 140.00 1.55 5091.96 .00 81.9	5087.59 .31 5088.00 1027.63 6.4 0. 5091.55 .41 5092.00 1148.25 6.9	.00 4.34 5088.00 1114.56 5086.00	.00 .01 5 0 0
.013825 10.91 564 .23 STAT 140.000 .020071 11.57 564 .25	.000 224 0 0 .00 .00 .000 258 0 0 .00	.050 220 126 563 4.47 ing cross- .050 244 110 563 5.12	.000 212 0 0 .00 section re .000 231 0 0 .00	1.59 5087.90 .00 86.9 .000 ach 140.00 1.55 5091.96 .00 81.9 .000	5087.59 .31 5088.00 1027.63 6.4 0. 5091.55 .41 5092.00 1148.25 6.9	.00 4.34 5088.00 1114.56 5086.00 .00 4.03 5092.00 1230.12 5090.00	.00 .01 5 0 0
.013825 10.91 564 .23 STAT 140.000 .020071 11.57 564 .25 STAT	.000 224 0 0 .00 .00 258 0 0 .00 US: Analyz	.050 220 126 563 4.47 ing cross- .050 244 110 563 5.12 ing cross-	.000 212 0 0 .00 section re .000 231 0 0 .00	1.59 5087.90 .00 86.9 .000 ach 140.00 1.55 5091.96 .00 81.9 .000 ach 145.00	5087.59 .31 5088.00 1027.63 6.4 0. 5091.55 .41 5092.00 1148.25 6.9	.00 4.34 5088.00 1114.56 5086.00 .00 4.03 5092.00 1230.12 5090.00	.00 .01 5 0 0
.013825 10.91 564 .23 STAT 140.000 .020071 11.57 564 .25 STAT 145.000 .016410	.000 224 0 0 .00 .00 258 0 0 .00 US: Analyz .000	.050 220 126 563 4.47 ing cross- .050 244 110 563 5.12 ing cross- .050 231	.000 212 0 0 .00 section re .000 231 0 0 .00	1.59 5087.90 .00 86.9 .000 ach 140.00 1.55 5091.96 .00 81.9 .000 ach 145.000	5087.59 .31 5088.00 1027.63 6.4 0. 5091.55 .41 5092.00 1148.25 6.9 0.	.00 4.34 5088.00 1114.56 5086.00 .00 4.03 5092.00 1230.12 5090.00	.00 .01 5 0 0
.013825 10.91 564 .23 STAT 140.000 .020071 11.57 564 .25 STAT 145.000 .016410 12.16	.000 224 0 0 .00 .00 258 0 0 .00 US: Analyz .000 231	.050 220 126 563 4.47 ing cross- .050 244 110 563 5.12 ing cross- .050 231	.000 212 0 0 .00 section re .000 231 0 0 .00	1.59 5087.90 .00 86.9 .000 ach 140.00 1.55 5091.96 .00 81.9 .000 ach 145.000 ach 145.000	5087.59 .31 5088.00 1027.63 6.4 0. 5091.55 .41 5092.00 1148.25 6.9 0. 5095.75 .40 5096.00	.00 4.34 5088.00 1114.56 5086.00 .00 4.03 5092.00 1230.12 5090.00	.00 .01 5 0 0
.013825 10.91 564 .23 STAT 140.000 .020071 11.57 564 .25 STAT 145.000 .016410	.000 224 0 0 .00 .00 258 0 0 .00 US: Analyz .000	.050 220 126 563 4.47 ing cross- .050 244 110 563 5.12 ing cross- .050 231	.000 212 0 0 .00 section re .000 231 0 .00 section re	1.59 5087.90 .00 86.9 .000 ach 140.00 1.55 5091.96 .00 81.9 .000 ach 145.000	5087.59 .31 5088.00 1027.63 6.4 0. 5091.55 .41 5092.00 1148.25 6.9 0.	.00 4.34 5088.00 1114.56 5086.00 .00 4.03 5092.00 1230.12 5090.00	.00 .01 5 0 0

STATUS: Analyzing cross-section reach 150.000.

PROJECT TITLE : Trans Jordan Landfill Flow Model

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SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
	•••••		•••••		•••••		
150.000	.000	.050	.000	1.69	5101.69	.00	.00
.021092	331	324	320	5102.18	.49	6.01	.03
12.94	0	100	0	.00	5102.00	5102.00	2
564	0	563	0	66.6	1171.05	1237.69	0
.27	.00	5.64	.00	.000	7.8	5100.00	0

STATUS: Analyzing cross-section reach 155.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

	Upstrea	im to Downs	tream Co	nveyance R	atio (KRAT	10)	1.69
155.000	.070	.050	.070	2.18	5104.18	.00	.00
.007362	186	190	196	5104.42	.24	2.21	.02
13.47	0	142	0	.00	5104.00	5104.00	3
564	0	563	0	76.7	1118.63	1195.35	0
.29	.02	3.96	.37	.000	8.1	5102.00	0

STATUS: Analyzing cross-section reach 160.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

.00	5109.22	5109.22	1.22	.000	.050	.000	160.000
.10	3.13	.58	5109.80	240	226	217	.035177
20	5110.00	5110.00	.00	0	92	0	14.08
11	1209.76	1129.10	80.7	0	563	0	564
0	5108.00	8.5	.000	.00	6.09	.00	.30

STATUS: Analyzing cross-section reach 165.000.

.00	.00	5112.14	2.14	.070	.050	.070	165.000
.00	2.92	.58	5112.72	114	117	128	.018342
4	5112.00	5112.00	.00	0	92	0	14.33
0	1133.89	1084.03	49.9	0	563	0	564
0	5110.00	8.7	nnn	በፕ	6.09	03	. 30

PROJECT TITLE : Trans Jordan Landfill Flow Model

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SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT TABLE 150 : Trans Jordan Landfill Flow Model

----- Bingham Creek 100-year Flood

09816-010-153

	Cross- Section Number	Channel Reach Length (ft)		Max. Low Chord Elevation (ft MSL)	C. S. Elevation		W. S. Elevation	W. S. Elevation	Energy Gradient Elevation (ft MSL)	Slope	Channel Mean Flow Velocity		Index 0 (0.01 * Convey.)
	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
	5.000	.00	.00	.00		564.00	4984.85			90.02		131.11	59.44
	10.000	222.84	.00	.00	4984.00	564.00	4986.98	.00	4987.52	118.16	5.88	99.78	51.89
*	15.000	180.30	.00	.00	4988.00	564.00	4990.06	4990.00	4990.72	288.44	6.55	86.06	33.21
	25.000	409.97	.00	.00	4994.00	564.00	4996.49	.00	4996.83	89.92	4.66	122.10	59.48
*	35.000	425.59	.00	.00	5004.00	564.00	5005.82	5005.82	5006.56	327.55	6.91	81.58	31.16
*	45.000	472.93	.00	.00	5012.00	564.00	5014.85	.00	5015.32	118.33	5.53	105.71	51.85
	50.000	219.51	.00	.00	5016.00	564.00	5018.29	.00	5018.98	240.45	6.68	84.85	36.37
*	55.000	200.39	.00	.00	5026.00	564.00	5027.67	5027.67	5028.36	331.26	6.65	84.83	30.99
	60.000	205.75	.00	.00	5030.00	564.00	5032.76	.00	5033.58	197.82	7.28	79.13	40.10
*	65.000	91.56	.00	.00	5032.00	564.00	5034.77	5034.77	5035.89	271.94	8.49	67.97	34.20
	70.000	173.88	.00	.00	5036.00	564.00	5038.99	.00	5039.93	199.71	7.83	73.99	39.91
*	75.000	191.87	.00	.00	5038.00	564.00	5041.50	.00	5041.81	54.90	4.47	129.70	76.12
*	80.000	120.20	.00	.00	5040.00	564.00	5042.38	.00	5042.88	147.37	5.71	99.31	46.46
*	85.000	182.00	.00	.00	5044.00	564.00	5046.22	5046.22	5047.16	303.49	7.77	72.72	32.37
	90.000	144.47	.00	.00	5048.00	564.00	5050.25	.00	5051.02	234.69	7.03	80.47	36.82
	95.000	191.71	.00	.00	5052.00	564.00	5054.70	5054.62	5055.70	246.50	8.02	71.51	35.92

PROJECT TITLE : Trans Jordan Landfill Flow Model

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	Cross- Section Number SECNO	Channel Reach Length (ft) XLCH	Top of Roadway Elevation (ft MSL) ELTRD	Chord	C. S. Elevation	Discharge Flow (cfs)	W. S. Elevation	W. S. Elevation	Energy Gradient Elevation (ft MSL) EG	Slope	Channel Mean Flow Velocity (ft/s) VCH	Section	Index Q (0.01 * Convey.)
*	100.000	182.94	.00	.00	5054.00	564.00	5057.86	.00	5058.52	103.87	6.64	92.26	55.34
*	105.000	199.25	.00	.00	5060.00	564.00	5062.03	5062.03	5062.91	315.42	7.50	75.21	31.76
	110.000	196.24	.00	.00	5064.00	564.00	5067.13	5067.05	5068.22	229.51	8.42	70.17	37.23
	115.000	208.91	.00	.00	5068.00	564.00	5071.06	.00	5071.63	118.77	6.10	95.83	51.75
*	120.000	251.79	.00	.00	5074.00	564.00	5075.35	.00	5075.81	246.41	5.40	104.46	35.93
	125.000	180.40	.00	.00	5078.00	564.00	5079.30	.00	5079.63	183.13	4.59	122.95	41.68
	130.000	167.86	.00	.00	5082.00	564.00	5083.11	.00	5083.55	301.25	5.30	106.44	32.50
*	135.000	220.83	.00	.00	5086.00	564.00	5087.59	.00	5087.90	138.25	4.47	126.20	47.97
(140.000	244.12	.00	.00	5090.00	564.00	5091.55	.00	5091.96	200.71	5.12	110.14	39.81
(145.000	231.28	.00	.00	5094.00	564.00	5095.75	.00	5096.15	164.10	5.08	110.96	44.03
	150.000	324.16	.00	.00	5100.00	564.00	5101.69	.00	5102.18	210.92	5.64	100.04	38.83
*	155.000	190.19	.00	.00	5102.00	564.00	5104.18	.00	5104.42	73.62	3.96	142.68	65.73
*	160.000	226.03	.00	.00	5108.00	564.00	5109.22	5109.22	5109.80	351.77	6.09	92.55	30.07
	165.000	117.90	.00	.00	5110.00	564.00	5112.14	.00	5112.72	183.42	6.09	92.60	41.64

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BOSS HEC-2 for AutoCAD version 2.0

PROJECT TITLE : Trans Jordan Landfill Flow Model

PROJECT NUMBER : 09816-010-153 4/10/1996

SUMMARY PRINTOUT TABLE 150 : Trans Jordan Landfill Flow Model
------ Bingham Creek 100-year Flood
09816-010-153

	Section Number	Flow (cfs)	W. S. Elevation (ft MSL)	W.S. Elev Diff per Profile (ft)	Diff per Section (ft)	Diff per Know/Comp (ft)	Surface Top Width (ft)	(ft)
	SECNO			DIFWSP				
	5.000	564.00	4984.85	.00	.00	.00	79.70	.00
	10.000	564.00	4986.98	.00	2:13	.00	48.54	222.84
*	15.000	564.00	4990.06	.00	3.07	.00	58.40	180.30
*	25.000	564.00	4996.49	.00	6.44	.00	61.15	409.97
*	35.000	564.00	5005.82	.00	9.33	.00	55.65	425.59
*	45.000	564.00	5014.85	.00	9.03	.00	56.18	472.93
	50.000	564.00	5018.29	.00	3.43	.00	51.67	219.51
*	55.000	564.00	5027.67	.00	9.38	.00	61.99	200.39
	60.000	564.00	5032.76	.00	5.09	.00	38.41	205.75
*	65.000	564.00	5034.77	.00	2.02	.00	33.33	91.56
	70.000	564.00	5038.99	.00	4.21	.00	32.41	173.88
*	75.000	564.00	5041.50	.00	2.51	.00	48.87	191.87
*	80.000	564.00	5042.38	.00	.88	.00	52.19	120.20
*	85.000	564.00	5046.22	.00	3.84	.00	40.37	182.00
	90.000	564.00	5050.25	.00	4.03	.00	42.91	144.47
	95.000	564.00	5054.70	.00	4.45	.00	34.64	191.71
*	100.000	564.00	5057.86	.00	3.16	.00	35.84	182.94
*	105.000	564.00	5062.03	.00	4.17	.00	44.10	199.25
	110.000	564.00	5067.13	.00	5.10	.00	32.71	196.24

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PROJECT TITLE : Trans Jordan Landfill Flow Model PROJECT NUMBER : 09816-010-153

	_							
		•	•		W.S. Elev Diff per			
	Number				Section	•		
					(ft)	•	•	•
	SECNO				DIFWSX			
	115.000	564.00	5071.06	.00	3.92	.00	43.13	208.91
*	120.000	564.00	5075.35	.00	4.30	.00	83.62	251.79
	125.000	564.00	5079.30	.00	3.95	.00	100.65	180.40
	130.000	564.00	5083.11	.00	3.81	.00	102.03	167.86
*	135.000	564.00	5087.59	.00	4.48	.00	86.93	220.83
	140.000	564.00	5091.55	.00	3.96	.00	81.87	244.12
	145.000	564.00	5095.75	.00	4.19	.00	71.56	231.28
	150.000	564.00	5101.69	.00	5.94	.00	66.64	324.16
	155.000	564.00	5104.18	.00	2.49	.00	76.72	190.19
΄,	160.000	564.00	5109.22	.00	5.05	.00	80.66	226.03
	165.000	564.00	5112.14	.00	2.92	.00	49.86	117.90

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 15, profile 1, conveyance change outside acceptable range.

Section 25, profile 1, conveyance change outside acceptable range.

Section 35, profile 1, critical depth assumed.

Section 35, profile 1, minimum specific energy.

Section 45, profile 1, conveyance change outside acceptable range.

Section 55, profile 1, critical depth assumed.

Section 55, profile 1, minimum specific energy.

Section 65, profile 1, critical depth assumed.

Section 65, profile 1, minimum specific energy.

ection 75, profile 1, conveyance change outside acceptable range.

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Section 80, profile 1, conveyance change outside acceptable range.

Section 85, profile 1, critical depth assumed.

Section 85, profile 1, minimum specific energy.

Section 100, profile 1, conveyance change outside acceptable range.

Section 105, profile 1, critical depth assumed.

Section 105, profile 1, minimum specific energy.

Section 120, profile 1, conveyance change outside acceptable range.

Section 135, profile 1, conveyance change outside acceptable range.

Section 155, profile 1, conveyance change outside acceptable range.

Section 160, profile 1, critical depth assumed.

Section 160, profile 1, probable minimum specific energy.

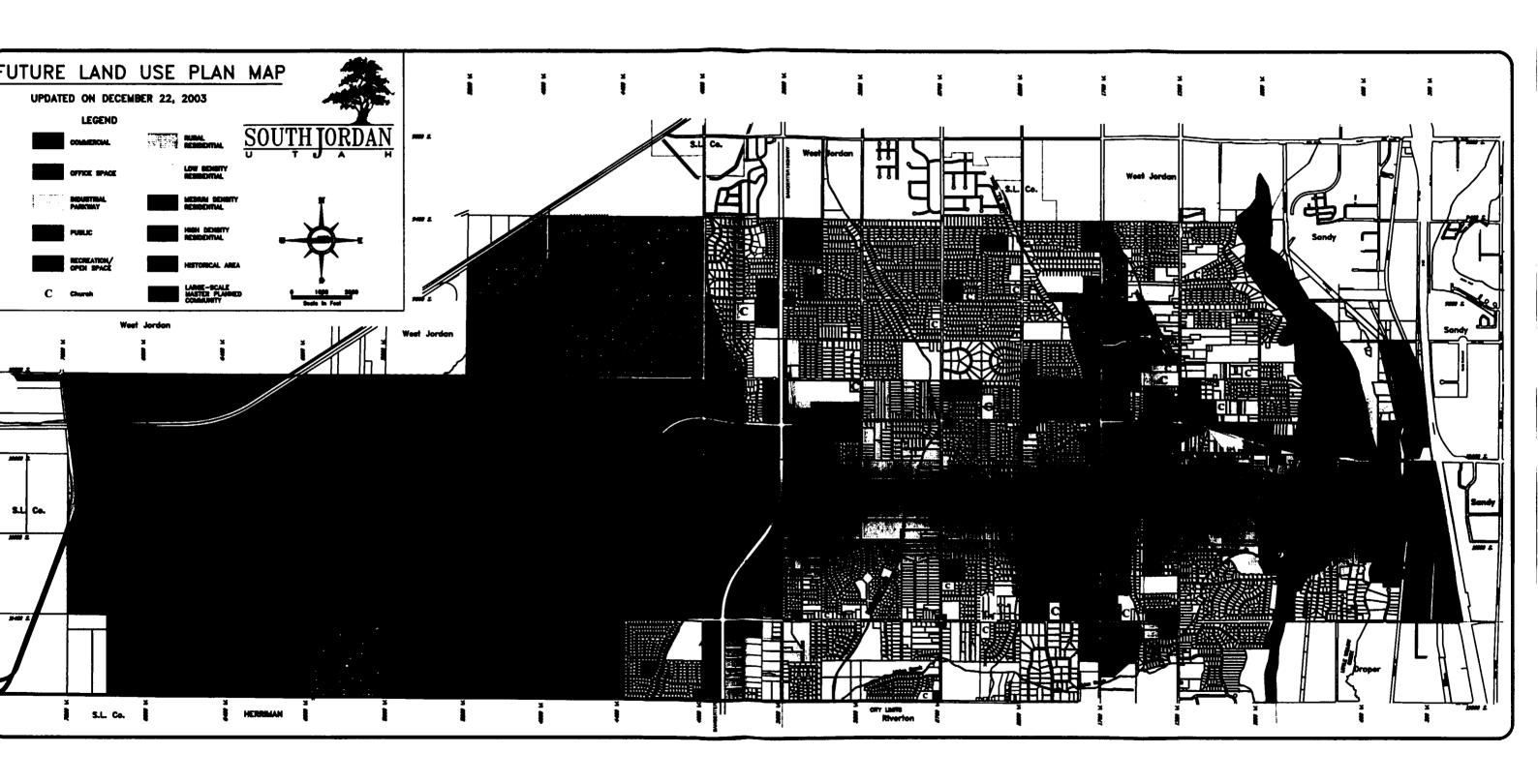
Section 160, profile 1, 20 trials attempted to balance water surface levation.

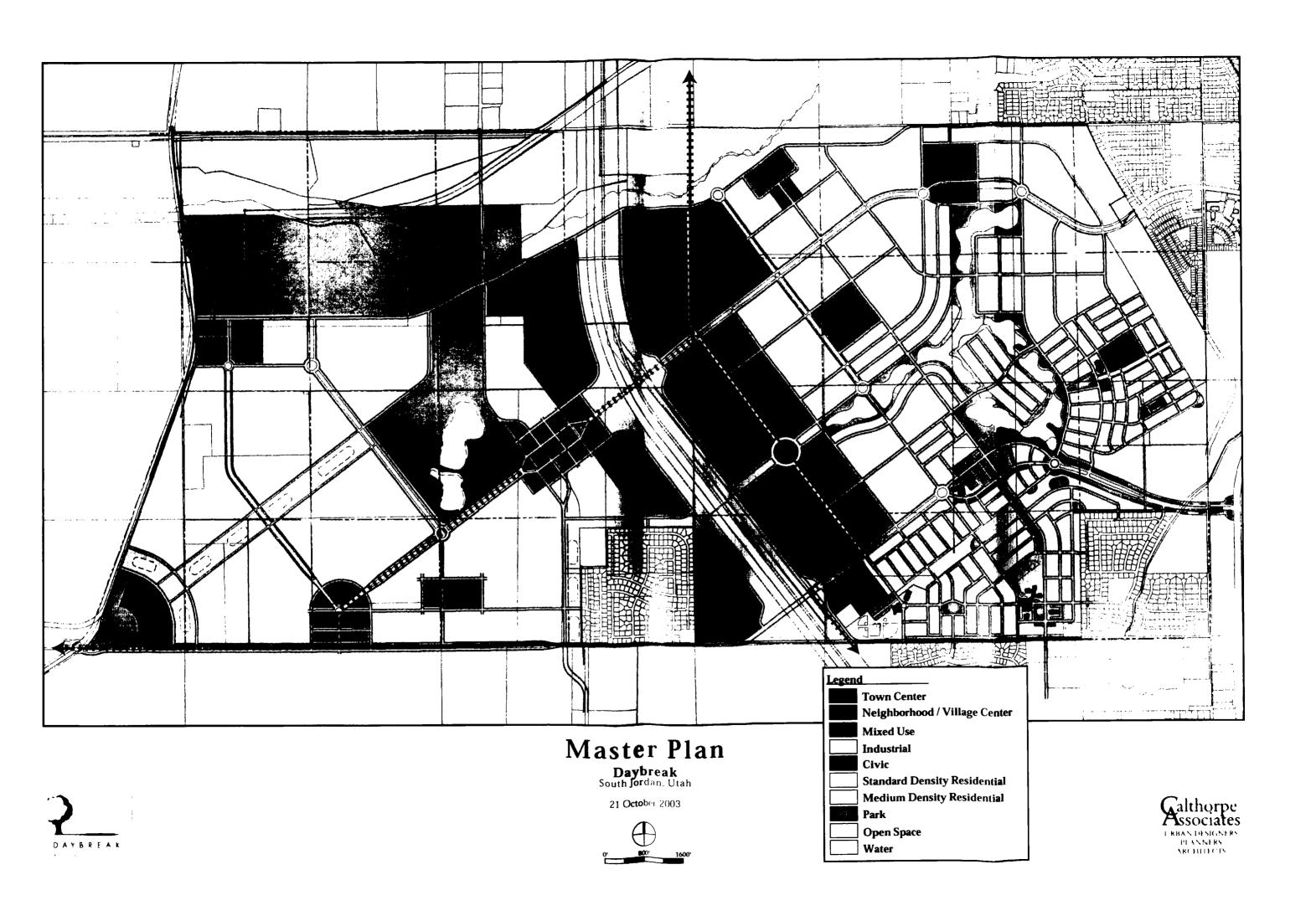
22 Warning and status message(s) generated

END OF OUTPUT

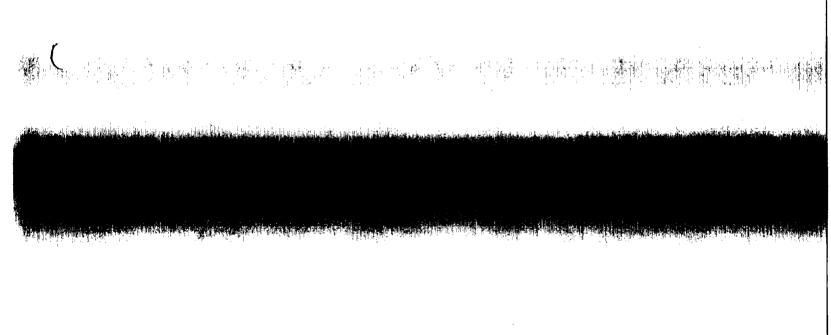
APPENDIX O – FUTURE LAND USE







APPENDIX P - TRUST AGREEMENT



TRUST AGREEMENT

This Trust Agreement ("Agreement") entered into as of <u>Jensey</u>, 1997, by and between Trans-Jordan Cities, an independent legal entity and a political subdivision of the State of Utah, ("Grantor"), and Zions First National Bank, Salt Lake City, Utah, ("Trustee").

Whereas, Utah Department of Environmental Quality ("UDEQ"), a department of the State of Utah, has established certain regulations applicable to the Grantor requiring that the owner or operator of a solid waste disposal facility must provide assurance that funds will be available when needed for closure and post-closure care of the facility.

Whereas, the Grantor has elected to establish a trust to provide such financial assurance for the facilities identified herein.

Whereas, the Grantor, acting through its duly authorized officers, has selected the trustee to be the trustee under this agreement, and the Trustee is willing to act as trustee.

Now, therefore, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

- (a) The term "fiduciary" means any person who exercises any power of control, management, or disposition or renders investment advice for a fee or other compensation, direct or indirect, with respect to any monies or other property of this trust fund, or has any authority or responsibility to do so, or who has any authority or responsibility in the administration of this trust fund.
- (b) The term "Grantor" means the owner or operator who enters into this Agreement and any successors or assigns of the Grantor.
- (c) The term "Trustee" means the Trustee who enters into this Agreement and any successor Trustee.
- (d) The term "Executive Secretary" means the Executive Secretary as defined in Title 19 of the Utah Code.

Section 2. Identification of Facilities and Cost Estimates. This Agreement pertains to Trans-Jordan Cities solid waste disposal located east of Bingham Canyon in Salt Lake

County. Adjusted cost estimates for closure and post-closure care for which financial assurance must be demonstrated are included in this agreement. Adjusted closure and post-closure estimates as prepared in accordance with the requirements of the UDEQ is \$2404,554.00.

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a trust fund ("Fund"). The Grantor and the Trustee intend that no third party have access to the Fund except as herein provided. The Fund is established initially as consisting of \$1,000,000, which is acceptable to the Trustee. Such amount and any other amounts subsequently transferred to the Trustee is referred to as the Fund, together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund will be held by the Trustee, in trust, as hereinafter provided. The Trustee undertakes no responsibility for the amount or adequacy of the Fund, nor any duty to collect from the Grantor.

Section 4. Payment for Closure and Post-Closure care. The Trustee will make such payments from the Fund as requested by the Executive Secretary, in writing, to provide for the payment of the costs of closure and/or post-closure care of the facilities covered by this Agreement. The Trustee will reimburse the Grantor, its successor-in-interest, or other persons as requested by Trans-Jordan Cities from the Fund for closure and post-closure expenditures in such amount of Trans-Jordan Cities will direct, in writing. Such reimbursements shall not be released until approved in writing by the Executive Secretary. The Executive Secretary shall act upon such reimbursement request within thirty (30) days after receiving the request. Such requests for reimbursement to Trustee shall be documented with records and other evidence of closure or post-closure costs. Copies of such documentation shall be maintained by Grantor.

<u>Section 5. Payments Comprising the Fund.</u> Payments made to the Trustee for the Fund will consist of cash or securities acceptable to the Trustee.

Section 6. Trustee Management. The Trustee will invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with investment guidelines and objectives communicated in writing to the Trustee from time to time by the Grantor, subject, however, to the provisions of this Section. In investing, reinvesting, exchanging, selling and managing the Fund,, the Trustee or any other fiduciary will discharge his duties with respect to the trust fund solely in the interest of the participants and beneficiaries and with the care, skill, prudence, and diligence under the circumstances then prevailing which

persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of any enterprise of a like character and with like aims, except that:

- (i) Securities or any obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended, 15 USC §80a-2(a), will not be acquired or held, unless they are securities or other obligations of the Federal or a State government;
- (ii) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee to the extent insured by an agency of the Federal or State government.

<u>Section 7. Commingling and Investment.</u> The Trustee is expressly authorized in its discretion:

- To transfer from time to time any or all of the assets of the Fund to any common, commingled or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein. To the extent of the equitable share of the Fund in any such commingled trust, such commingled trust will be part of the Fund;
- (b) To purchase shares in any investment company registered under the trivestment Company Act of 1940, 15 USC §80a-1 et seq., or one which may be created, managed, underwritten or to which investment advice is rendered or the share of which are sold by the Trustee may vote such share in its discretion..

<u>Section 8. Advice of Counsel.</u> The Trustee may from time to time consult with counsel, who may be counsel to the Grantor, with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee will be fully protected to the extent permitted by law in acting upon the advise of counsel.

<u>Section 9. Trustee Compensation.</u> The Trustee will be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the Grantor.

Section 10. Successor Trustee. Upon the written agreement of the Grantor and the Trustee, the Trustee may resign or the Grantor may replace the Trustee. The Trustee which is being replaced shall be responsible under the terms and conditions of this Agreement until the new Trustee has been approved and signed this Agreement. In either event, the Grantor will appoint a successor Trustee who will have the same powers and duties as those conferred upon the Trustee hereunder. Upon acceptance of the appointment by the successor trustee, the Trustee will assign, transfer and pay over to the successor trustee the funds and properties then constituting the fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of the successor trustee or for instructions. The successor trustee and the date on which he assumes administration of the trust will be specified in writing and sent to the Grantor and the present and successor trustees by certified mail ten (10) days before such changes become effective.

Section 11. Instruction to the Trustee. All orders, requests and instructions by the Grantor to the Trustee will be in writing, signed by such authorized representatives as are designated by the Grantor, Trustee and/or Executive Secretary. The Trustee will have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor hereunder has occurred. The Trustee will have no duty to act in the absence of such orders, requests and instructions from the Grantor except as provided for herein.

Section 12. Notice of Nonpayment. The Trustee will notify the Grantor by certified mail within ten (10) days following the expiration of the thirty-day period after the anniversary of the establishment of the Trust if no payment is received from the Grantor during that period. After the pay-in period, as described in U.A.C. R315-309-3(3)(c), is completed, the Trustee is not required to send a notice of nonpayment. Such notice shall also be contained within the required annual report.

Section 13. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor and Trustee with the approval of the Executive Secretary, or by the Trustee and the Executive Secretary of the Utah Hazardous Waste Control Board if the Grantor ceases to exist.

Section 14. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 13, and R315-309-3 of UDEQ, this Trust will be irrevocable and will continue until terminated at the written agreement of the Grantor and

the Trustee and approval of the Executive Secretary. Upon termination of the Trust, all remaining trust property, less final trust administration expenses, will be delivered to the Grantor.

Section 15. Immunity and Indemnification. The Trustee will not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this Trust, or in carrying out any directions by the Grantor issued in accordance with this Agreement. The Trustee will be indemnified and saved harmless by the Grantor from the Trust Fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense,

Section 16. Choice of Law. This Agreement will be administrated, construed and enforced according to the laws of the State of Utah.

<u>Section 17. Interpretation.</u> As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement will not affect the interpretation or the legal efficacy of this Agreement.

In witness whereof the parties have caused this Agreement to be executed by their respective officers fully authorized and their corporate seals to be hereunto affixed and attested as of the date first above written.

TRANS-JORDAN CITIES

By: V	m Dedpuis	les	Title: V	ans Arlon Chairman	& Doard
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(Seal)					
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Attest:	May K Polith			AND TRUST QUEION	
Title:	2ND VICE PRESIDEN			THE THOSE SPENO	
(Seal)	AND TRUST OFFICE: OFFICE OFF	5			

APPROVED AS TO FORM AND CONTENT:

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

By:

6

APPENDIX Q – TITLE V OPERATING PERMIT

DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF AIR QUALITY

─ Michael O. Leavitt

Governor P.O. Box 144820

150 North 1950 West

Dianne R. Nielson, Ph.D.

Salt Lake City, Utah 84114-4820

Executive Director

(801) 536-4099 Fax

Richard W. Sprott

(801) 536-4414 T.D.D.

Web: www.deq.state.ut.us

Title V Operating Permit

PERMIT NUMBER: 3500535001 DATE OF PERMIT: May 21, 2002 Date of Last Revision: May 21, 2002

This Operating Permit is issued to, and applies to the following:

Name of Permittee:

Permitted Location:

Trans-Jordan Cities 10873 S. 7200 W. PO Box 95610 South Jordan, UT 84095-0610

Trans-Jordan Landfill 10873 South 7200 West South Jordan, UT 84095-0610

UTM coordinates: 4,490,492 meters Northing, 410,879 meters Easting

SIC code: 4953

ABSTRACT

Trans-Jordan Cities operates the Trans-Jordan Landfill, a municipal solid waste (MSW) landfill source located in Salt Lake County, Utah. The facility accepts municipal and commercial waste. Trans-Jordan Landfill is a Title V source because 40 CFR 60 Subpart WWW has required all landfills over 2.5 million megagrams to submit a Title V application. Trans-Jordan Landfill is subject to 40 CFR 60, Subpart A -General Provisions and to Subpart WWW - Standards of Performance for Municipal Solid Waste Landfills. Trans-Jordan Landfill is also subject to Subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) -National Emission Standards for Asbestos: Standards for Active Waste Disposal Sites (40 CFR 61.154) as well as to Subpart A - General Provisions of the National Emission Standards for Hazardous Air Pollutants (NESHAP).

UTAH AIR QUALITY BOARD

By:

Prepared By:

Richard W. Sprott, Executive Secretary

James Chapman

Operating Permit History

5/21/02 - Permit issued	Action initiated by an initial operating permit application	Title V Permit Issued
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Issued under authority of Utah Code Ann. Section 19-2-104 and 19-2-109.1, and in accordance with Utah Administrative Code R307-415 Operating Permit Requirements.

All definitions, terms and abbreviations used in this permit conform to those used in Utah Administrative Code R307-101 and R307-415 (Rules), and 40 Code of Federal Regulations (CFR), except as otherwise defined in this permit. Unless noted otherwise, references cited in the permit conditions refer to the Rules.

Where a permit condition in Section I, General Provisions, partially recites or summarizes an applicable rule, the full text of the applicable portion of the rule shall govern interpretations of the requirements of the rule. In the case of a conflict between the Rules and the permit terms and conditions of Section II, Special Provisions, the permit terms and conditions of Section II shall govern except as noted in Provision I.M, Permit Shield.

Section I: General Provisions

I.A. Federal Enforcement.

All terms and conditions in this permit, including those provisions designed to limit the potential to emit, are enforceable by the EPA and citizens under the Clean Air Act of 1990 (CAA) except those terms and conditions that are specifically designated as "State Requirements". (R307-415-6b)

I.B. Permitted Activity(ies).

Except as provided in R307-415-7b(1), the permittee may not operate except in compliance with this permit. (See also Provision I.E, Application Shield)

I.C. **Duty to Comply.**

- I.C.1 The permittee must comply with all conditions of the operating permit. Any permit noncompliance constitutes a violation of the Air Conservation Act and is grounds for any of the following: enforcement action; permit termination; revocation and reissuance; modification; or denial of a permit renewal application. (R307-415-6a(6)(a))
- I.C.2 It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. (R307-415-6a(6)(b))
- I.C.3 The permittee shall furnish to the Executive Secretary, within a reasonable time, any information that the Executive Secretary may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. Upon request, the permittee shall also furnish to the Executive Secretary copies of records required to be kept by this permit or, for information claimed to be confidential, the permittee may furnish such records directly to the EPA along with a claim of confidentiality. (R307-415-6a(6)(e))
- I.C.4 This permit may be modified, revoked, reopened, and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance shall not stay

any permit condition, except as provided under R307-415-7f(1) for minor permit modifications. (R307-415-6a(6)(c))

I.D. Permit Expiration and Renewal.

- I.D.1 This permit is issued for a fixed term of five years and expires on May 21, 2007. (R307-415-6a(2))
- I.D.2 Application for renewal of this permit is due by November 21, 2006. An application may be submitted early for any reason. (R307-415-5a(1)(c))
- I.D.3 An application for renewal submitted after the due date listed in I.D.2 above shall be accepted for processing, but shall not be considered a timely application and shall not relieve the permittee of any enforcement actions resulting from submitting a late application. (R307-415-5a(5))
- I.D.4 Permit expiration terminates the permittee's right to operate unless a timely and complete renewal application is submitted consistent with R307-415-7b (see also Provision I.E, Application Shield) and R307-415-5a(1)(c) (see also Provision I.D.2). (R307-415-7c(2))

I.E. Application Shield.

If the permittee submits a timely and complete application for renewal, the permittee's failure to have an operating permit will not be a violation of R307-415, until the Executive Secretary takes final action on the permit renewal application. In such case, the terms and conditions of this permit shall remain in force until permit renewal or denial. This protection shall cease to apply if, subsequent to the completeness determination required pursuant to R307-415-7a(3), and as required by R307-415-5a(2), the applicant fails to submit by the deadline specified in writing by the Executive Secretary any additional information identified as being needed to process the application. (R307-415-7b(2))

I.F. Severability.

In the event of a challenge to any portion of this permit, or if any portion of this permit is held invalid, the remaining permit conditions remain valid and in force. (R307-415-6a(5))

I.G. Permit Fee.

- I.G.1 The permittee shall pay an annual emission fee to the Executive Secretary consistent with R307-415-9. (R307-415-6a(7))
- I.G.2 The emission fee shall be due on October 1 of each calendar year or 45 days after the source receives notice of the amount of the fee, whichever is later. (R307-415-9(4)(a))

I.H. No Property Rights.

This permit does not convey any property rights of any sort, or any exclusive privilege. (R307-415-6a(6)(d))

I.l. Revision Exception.

No permit revision shall be required, under any approved economic incentives, marketable permits, emissions trading and other similar programs or processes for changes that are provided for in this permit. (R307-415-6a(8))

I.J. Inspection and Entry.

- I.J.1 Upon presentation of credentials and other documents as may be required by law, the permittee shall allow the Executive Secretary or an authorized representative to perform any of the following:
- I.J.1.a Enter upon the permittee's premises where the source is located or emissions related activity is conducted, or where records are kept under the conditions of this permit. (R307-415-6c(2)(a))
- I.J.1.b Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit. (R307-415-6c(2)(b))
- I.J.1.c Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practice, or operation regulated or required under this permit. (R307-415-6c(2)(c))
- I.J.1.d Sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with this permit or applicable requirements. (R307-415-6c(2)(d))
- I.J.2 Any claims of confidentiality made on the information obtained during an inspection shall be made pursuant to Utah Code Ann. Section 19-1-306. (R307-415-6c(2)(e))

I.K. Certification.

Any application form, report, or compliance certification submitted pursuant to this permit shall contain certification as to its truth, accuracy, and completeness, by a responsible official as defined in R307-415-3. This certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. (R307-415-5d)

I.L. Compliance Certification.

- I.L.1 Permittee shall submit to the Executive Secretary an annual compliance certification, certifying compliance with the terms and conditions contained in this permit, including emission limitations, standards, or work practices. This certification shall be submitted no later than April 15, 2003 and that date each year following until this permit expires. The certification shall include all the following (permittee may cross-reference this permit or previous reports): (R307-415-6c(5))
- I.L.1.a The identification of each term or condition of this permit that is the basis of the certification;
- I.L.1.b The identification of the methods or other means used by the permittee for determining the compliance status with each term and condition during the certification period, and whether such methods or other means provide continuous or intermittent data. Such

methods and other means shall include, at a minimum, the monitoring and related recordkeeping and reporting requirements in this permit. If necessary, the permittee also shall identify any other material information that must be included in the certification to comply with section 113(c)(2) of the Act, which prohibits knowingly making a false certification or omitting material information;

I.L.1.c The status of compliance with the terms and conditions of the permit for the period covered by the certification, based on the method or means designated in Provision I.L.1.b. The certification shall identify each deviation and take it into account in the compliance certification. The certification shall also identify as possible exceptions to compliance any periods during which compliance is required and in which an excursion or exceedance as defined under 40 CFR Part 64 occurred; and

Such other facts as the Executive Secretary may require to determine the compliance status.

I.L.2 The permittee shall also submit all compliance certifications to the EPA, Region VIII, at the following address or to such other address as may be required by the Executive Secretary: (R307-415-6c(5)(d))

Office of Enforcement, Compliance and Environmental Justice (mail code 8ENF)
EPA, Region VIII
999 18th Street, Suite 300
Denver, CO 80202-2466

I.M. Permit Shield.

I.L.1.d

- I.M.1 Compliance with the provisions of this permit shall be deemed compliance with any applicable requirements as of the date of this permit, provided that:
- I.M.1.a Such applicable requirements are included and are specifically identified in this permit, or (R307-415-6f(1)(a))
- I.M.1.b Those requirements not applicable to the source are specifically identified and listed in this permit. (R307-415-6f(1)(b))
- I.M.2 Nothing in this permit shall alter or affect any of the following:
- I.M.2.a The emergency provisions of Utah Code Ann. Section 19-1-202 and Section 19-2-112, and the provisions of the CAA Section 303. (R307-415-6f(3)(a))
- I.M.2.b The liability of the owner or operator of the source for any violation of applicable requirements under Utah Code Ann. Section 19-2-107(2)(g) and Section 19-2-110 prior to or at the time of issuance of this permit. (R307-415-6f(3)(b)
- I.M.2.c The applicable requirements of the Acid Rain Program, consistent with the CAA Section 408(a). (R307-415-6f(3)(c))

I.M.2.d The ability of the Executive Secretary to obtain information from the source under Utah Code Ann. Section 19-2-120, and the ability of the EPA to obtain information from the source under the CAA Section 114. (R307-415-6f(3)(d))

I.N. Emergency Provision.

- I.N.1 An "emergency" is any situation arising from sudden and reasonably unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under this permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventive maintenance, careless or improper operation, or operator error. (R307-415-6g(1))
- I.N.2 An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology-based emission limitations if the affirmative defense is demonstrated through properly signed, contemporaneous operating logs, or other relevant evidence that:
- I.N.2.a An emergency occurred and the permittee can identify the causes of the emergency. (R307-415-6g(3)(a))
- 1.N.2.b The permitted facility was at the time being properly operated. (R307-415-6g(3)(b))
- I.N.2.c During the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in this permit. (R307-415-6g(3)(c))
- I.N.2.d The permittee submitted notice of the emergency to the Executive Secretary within two working days of the time when emission limitations were exceeded due to the emergency. This notice must contain a description of the emergency, any steps taken to mitigate emissions, and corrective actions taken. This notice fulfills the requirement of Provision I.S.2.c below. (R307-415-6g(3)(d))
- I.N.3 In any enforcement proceeding, the permittee seeking to establish the occurrence of an emergency has the burden of proof. (R307-415-6g(4))
- I.N.4 This emergency provision is in addition to any emergency or upset provision contained in any other section of this permit. (R307-415-6g(5))

I.O. Operational Flexibility.

Operational flexibility is governed by R307-415-7d(1).

I.P. Off-permit Changes.

Off-permit changes are governed by R307-415-7d(2).

I.Q. Administrative Permit Amendments.

Administrative permit amendments are governed by R307-415-7e.

Permit Modifications.

Permit modifications are governed by R307-415-7f.

I.S.	Records	and l	Reporting.
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I.S.1	Records.
I.S.1.a	The records of all required monitoring data and support information shall be retained by the permittee for a period of at least five years from the date of the monitoring sample, measurement, report, or application. Support information includes all calibration and maintenance records, all original strip-charts or appropriate recordings for continuous monitoring instrumentation, and copies of all reports required by this permit. (R307-415-6a(3)(b)(ii)
I.S.1.b	For all monitoring requirements described in Section II, Special Provisions, the source shall record the following information, where applicable: (R307-415-6a(3)(b)(i))
I.S.1.b.1	The date, place as defined in this permit, and time of sampling or measurement.
I.S.1.b.2	The date analyses were performed.
I.S.1.b.3	The company or entity that performed the analyses.
I.S.1.b.4	The analytical techniques or methods used.
1.0.1.b.5	The results of such analyses.
I.S.1.b.6	The operating conditions as existing at the time of sampling or measurement.
I.S.1.c	Additional record keeping requirements, if any, are described in Section II, Special Provisions.
I.S.2	Reports.
I.S.2.a	Monitoring reports shall be submitted to the Executive Secretary every six months, or more frequently if specified in Section II. All instances of deviation from permit requirements shall be clearly identified in the reports. (R307-415-6a(3)(c)(i))
I.S.2.b	All reports submitted pursuant to Provision I.S.2.a shall be certified by a responsible official in accordance with Provision I.K of this permit. (R307-415-6a(3)(c)(i)
I.S.2.c	The Executive Secretary shall be notified promptly of any deviations from permit requirements including those attributable to upset conditions as defined in this permit, the probable cause of such deviations, and any corrective actions or preventative measures taken. Prompt, as used in this condition, shall be defined as written notification within 7 days. Deviations from permit requirements due to unavoidable breakdowns shall be reported in accordance with the provisions of R307-107. (R307-415-6a(3)(c)(ii))

I.S.3 Notification Addresses.

I.S.3.a All reports, notifications, or other submissions required by this permit to be submitted to the Executive Secretary are to be sent to the following address or to such other address as may be required by the Executive Secretary:

Utah Division of Air Quality P.O. Box 144820 Salt Lake City, UT 84114-4820 Phone: 801-536-4000

I.S.3.b All reports, notifications or other submissions required by this permit to be submitted to the EPA should be sent to one of the following addresses or to such other address as may be required by the Executive Secretary:

For annual compliance certifications

Environmental Protection Agency, Region VIII Office of Enforcement, Compliance and Environmental Justice (mail code 8ENF) 999 18th Street, Suite 300 Denver, CO 80202-2466

For reports, notifications, or other correspondence related to permit modifications, applications, etc.
Environmental Protection Agency, Region VIII
Office of Partnerships & Regulatory Assistance
Air & Radiation Program (mail code 8P-AR)
999 18th Street, Suite 300
Denver, CO 80202-2466

Phone: 303-312-6440

I.T. Reopening for Cause.

- I.T.1 A permit shall be reopened and revised under any of the following circumstances:
- I.T.1.a New applicable requirements become applicable to the permittee and there is a remaining permit term of three or more years. No such reopening is required if the effective date of the requirement is later than the date on which this permit is due to expire, unless the terms and conditions of this permit have been extended pursuant to R307-415-7c(3), application shield. (R307-415-7g(1)(a))
- I.T.1.b The Executive Secretary or EPA determines that this permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of this permit. (R307-415-7g(1)(c))
- I.T.1.c EPA or the Executive Secretary determines that this permit must be revised or revoked to assure compliance with applicable requirements. (R307-415-7g(1)(d))
- I.T.1.d Additional applicable requirements are to become effective before the renewal date of this permit and are in conflict with existing permit conditions. (R307-415-7g(1)(e))

- Proceedings to reopen and issue a permit shall follow the same procedures as apply to initial permit issuance and shall affect only those parts of this permit for which cause to reopen exists.

 (R307-415-7g(2))
- I.U. Inventory Requirements.
- I.U.1 An emission inventory shall be submitted in accordance with the procedures of R307-150, Emission Inventories. (R307-150)
- I.U.2 A Hazardous Air Pollutant Inventory shall be submitted in accordance with the procedures of R307-155, Hazardous Air Pollutant Inventory. (R307-155)
- I.U.3 An emission statement shall be submitted in accordance with the procedures in R307-158, Emission Statement Inventory. (R307-158)

Section II: SPECIAL PROVISIONS

II.A. Emission Unit(s) Permitted to Discharge Air Contaminants.

(R307-415-4(3)(a) and R307-415-4(4))

II.A.1 MSW Landfill (designated as Landfill)

Unit Description: Class I Sanitary Landfill with a 10,576,522 Mg capacity. Opened in 1955, lateral expansion in 1997/98. NSPS WWW applies to this unit.

II.A.2 Misc. Tanks (designated as Tanks)

Unit Description: 2 above ground tanks. 1,000 gallon unleaded gasoline and 3,000 gallon diesel. No unit-specific applicable requirements.

II.A.3 Cold Cleaning Unit (designated as Parts Washer)

Unit Description: Small parts vapor cleaner, serviced by off-site manufacturer.

II.A.4 Generators (designated as Generators)

Unit Description: Diesel generators used for light poles, less than 50 Hp. No unit-specific applicable requirements.

II.B. Requirements and limitations.

The following emission limitations, standards, and operational limitations apply to the permitted facility as indicated: (R307-415-6a(1))

II.B.1 Conditions on permitted source (Source-wide)

II.B.1.a Condition:

Visible emissions caused by fugitive dust shall not exceed 10% at the property boundary, and 20% onsite except during periods when wind speeds exceed 25 miles per hour and control measures in the most recently approved fugitive dust control plan are being taken. [Authority granted under R307-309-3(1) & R307-309-4(3); condition originated in R307-309-3 through 9]

II.B.1.a.1 Monitoring:

In lieu of monitoring via visible emissions observations, adherence to the most recently approved fugitive dust control plan shall be monitored to demonstrate that appropriate measures are being implemented to control fugitive dust.

II.B.1.a.2 Recordkeeping:

Records of measures taken to control fugitive dust shall be maintained to demonstrate adherence to the most recently approved fugitive dust control plan. If wind speeds are measured to establish an exception from the above visible emissions limits, records of those measurements shall be maintained. Records shall be maintained as described in Provision I.S.1 of this permit.

II.B.1.a.3 Reporting:

There are no reporting requirements for this provision except those specified in Section I of this permit.

II.B.1.b Condition:

Visible emissions shall be no greater than 20 percent opacity. [Authority granted under R307-201-1(1); condition originated in R307-201]

1.b.1

Monitoring:

A visual opacity survey of each affected emission unit shall be performed on a quarterly basis by an individual trained on the observation procedures of 40 CFR 60, Appendix A, Method 9. If visible emissions other than steam are observed from an emission unit, an opacity determination of that emission unit shall be performed by a certified observer within 24 hours of the initial survey. The opacity determination shall be performed in accordance with 40 CFR 60, Appendix A, Method 9 for point sources, and in accordance with 58 FR 61640 Method 203C for fugitive emission sources.

II.B.1.b.2

Recordkeeping:

The permittee shall record the date of each visual opacity survey and keep a list of the emission points checked during the visual opacity survey. The permittee shall also keep a log of the following information for each observed visual emission: date and time visual emissions observed, emission point location and description, time and date of opacity test, and percent opacity. The records required by this provision and all data required by 40 CFR 60, Appendix A, Method 9 shall be maintained in accordance with Provision I.S.1 of this permit.

II.B.1.b.3

Reporting:

There are no reporting requirements for this provision except those specified in Section I of this permit.

II.B.1.c

Condition:

Sulfur content of any fuel oil combusted shall be no greater than 0.85 lb/MMBtu heat input. [Authority granted under R307-203-1; condition originated in R307-203]

II.B.1.c.1

Monitoring:

For each delivery of oil, the permittee shall either:

- (1) Determine the fuel sulfur content expressed as lb/MMBtu in accordance with the methods of the American Society for Testing Materials (ASTM) and Equation 1;
- (2) Inspect the fuel sulfur content expressed as lb/MMBtu determined by the vendor using methods of the ASTM and Equation 1; or
- (3) Inspect documentation provided by the vendor that indirectly demonstrates compliance with this provision.

Equation 1:

Fuel Sulfur Content, lb/MMBtu = [(Weight percent sulfur/100) x Density (lb/gal)] / [(gross heating value (Btu/gal)) x (1 MMBtu/1,000,000 Btu)]

II.B.1.c.2

Recordkeeping:

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Results of monitoring shall be maintained as described in Provision I.S.1 of this permit.

II.B.1.c.3 Reporting:

There are no reporting requirements for this provision except those specified in Section I of this permit.

II.B.1.d Condition:

The permittee shall comply with the applicable requirements for recycling and emission reduction for class I and class II refrigerants pursuant to 40 CFR 82, Subpart F - Recycling and Emissions Reduction. [Authority granted under 40 CFR 82.150(b); condition originated in 40 CFR 82]

II.B.1.d.1 Monitoring:

The permittee shall certify, in the annual compliance statement required in Section I of this permit, its compliance status with the requirements of 40 CFR 82, Subpart F.

II.B.1.d.2 Recordkeeping:

All records required in 40 CFR 82, Subpart F shall be maintained consistent with the requirements of Provision S.1 in Section I of this permit.

II.B.1.d.3 Reporting:

All reports required in 40 CFR 82, Subpart F shall be submitted as required. There are no additional reporting requirements except as outlined in Section I of this permit.

II.B.1.e Condition:

Records shall be maintained of the material (salt, crushed slag, or sand) applied to the roads. [Authority granted under R307-307; condition originated in R307-307]

II.B.1.e.1 Monitoring:

Records required for this permit condition will serve as monitoring.

II.B.1.e.2 Recordkeeping:

The following records shall be maintained as outlined in Provision I.S.1 of this permit:

For Salt - the quantity applied, the percent by weight of insoluble solids in the salt, and the percentage of the material that is sodium chloride (NaCl).

For Sand or Crushed Slag - the quantity applied and the percent by weight of fine material which passes the number 200 sieve in a standard gradation analysis. (origin: R307-307)

II.B.1.e.3 Reporting:

There are no reporting requirements for this provision except those specified in Section I of this permit.

Conditions on MSW Landfill (Landfill)

II.B.2.a Condition:

7 2

- (a) The permittee shall calculate a nonmethane organic compounds (NMOC) emission rate for the landfill using the procedures specified in monitoring. The NMOC emission rate shall be recalculated annually, except as provided in paragraph (b)(1)(i) of reporting.
- (1) If the calculated NMOC emission rate is less than 50 megagrams per year, the permittee shall:
- (i) Submit an annual emission report to the Executive Secretary, except as provided for in paragraph (b)(1)(i) of reporting; and
- (ii) Recalculate the NMOC emission rate annually using the procedures specified in (a) of monitoring until such time as the calculated NMOC emission rate is equal to or greater than 50 megagrams per year, or the landfill is closed.
- (A) If the NMOC emission rate, upon recalculation required in paragraph (a)(1)(ii), is equal to or greater than 50 megagrams per year, the permittee shall install a collection and control system in compliance with 40 CFR 60.752(b)(2).
- (B) If the landfill is permanently closed, a closure notification shall be submitted to the Executive Secretary as provided for in (d) of reporting.
- (2) If the calculated NMOC emission rate is equal to or greater than 50 megagrams per year, the permittee shall:
- (i) Submit a collection and control system design plan prepared by a professional engineer to the Executive Secretary within 1 year:
- (A) The collection and control system as described in the plan shall meet the design requirements of paragraph 40 CFR 60.752(b)(2)(ii).
- (B) The collection and control system design plan shall include any alternatives to the operational standards, test methods, procedures, compliance measures, monitoring, recordkeeping or reporting provisions of 40 CFR 60.753 through 60.758 proposed by the permittee.
- (C) The collection and control system design plan shall either conform with specifications for active collection systems in 40 CFR 60.759 or include a demonstration to the Executive Secretary's satisfaction of the sufficiency of the alternative provisions to 40 CFR 60.759.
- (ii) The permittee shall install a collection and control system capable of meeting emissions standards in 40 CFR 60.750 within 30 months of the date when the landfill has an emission rate of NMOC of 50 megagrams per year or more.
- (b) When the MSW landfill is closed, the permittee is no longer subject to the requirement to maintain an operating permit under 40 CFR 70 for the landfill if the landfill is not otherwise subject to the requirements of either 40 CFR 70 and if either of the following conditions are met:

- (1) The landfill was never subject to the requirement for a control system under paragraph (a)(2); or
- (2) The permittee meets the conditions for control system removal specified in 40 CFR 60.752(b)(2)(v). [40 CFR 60.752(d)] [Authority granted under 40 CFR 60.750; condition originated in 40 CFR 60.750]

II.B.2.a.1

Monitoring:

The permittee shall monitor the NMOC emission rate by using the equations in (a) and following the three tier process outlined in (b), (c), and (d).

- (a) The permittee shall calculate the NMOC emission rate using either the equation provided in paragraph (a)(1) or the equation provided in paragraph (a)(2). Both equations may be used if the actual year-to-year solid waste acceptance rate is known, as specified in paragraph (a)(1) for part of the life of the landfill and the actual year-to-year solid waste acceptance rate is unknown, as specified in paragraph (a)(2), for part of the life of the landfill. The values to be used in both equations are 0.05 per year for k, 170 cubic meters per megagram for Lo, and 4,000 parts per million by volume as hexane for the C_{NMOC}. For landfills located in geographical areas with a thirty-year annual average precipitation of less than 25 inches, as measured at the nearest representative official meteorological site, the k value to be used is 0.02 per year.
- (1) The following equation shall be used if the actual year-to-year solid waste acceptance rate is known.

$$M_{NMOC} = Sum (2 k L_o M_i (e^{-kti})(C_{NMOC})(3.6x10^{-9}))$$
 of i through n

where.

M_{NMOC}=Total NMOC emission rate from the landfill, megagrams per year k=methane generation rate constant, per year

Lo=methane generation potential, cubic meters per megagram solid waste M_i =mass of solid waste in the i^{th} section, megagrams t_i =age of the i^{th} section, years

 C_{NMOC} =concentration of NMOC, parts per million by volume as hexane 3.6×10^{-9} =conversion factor

The mass of nondegradable solid waste may be subtracted from the total mass of solid waste in a particular section of the landfill when calculating the value for M_1 if documentation of the nature and amount of such wastes is maintained.

(2) The following equation shall be used if the actual year-to-year solid waste acceptance rate is unknown.

$$M_{NMOC}$$
=2 L_o R (e^{-kc} - e^{-kt}) (C_{NMOC}) (3.6×10⁻⁹)

Where:

M_{NMOC}=mass emission rate of NMOC, megagrams per year

L_o=methane generation potential, cubic meters per megagram solid waste R=average annual acceptance rate, megagrams per year k=methane generation rate constant, per year t = age of landfill, years

C_{NMOC}=concentration of NMOC, parts per million by volume as hexane c=time since closure, years; for active landfill c=O and e^{-kc}=1

3.6×10⁻⁹=conversion factor

The mass of nondegradable solid waste may be subtracted from the total mass of solid waste in a particular section of the landfill when calculating the value of R, if documentation of the nature and amount of such wastes is maintained.

- (b) Tier 1. The permittee shall compare the calculated NMOC mass emission rate to the standard of 50 megagrams per year.
- (1) If the NMOC emission rate calculated in (a) is less than 50 megagrams per year, then the permittee shall submit an emission rate report as provided in paragraph (b)(1) of reporting, and shall recalculate the NMOC mass emission rate annually as required under paragraph (a)(1) of this condition.
- (2) If the calculated NMOC emission rate is equal to or greater than 50 megagrams per year, then the permittee shall either comply with paragraph (a)(2) of this condition, or determine a site-specific NMOC concentration and recalculate the NMOC emission rate using the procedures provided in (c).
- (c) Tier 2. The permittee shall determine the NMOC concentration using the following sampling procedure. The permittee shall install at least two sample probes per hectare of landfill surface that has retained waste for at least 2 years. If the landfill is larger than 25 hectares in area, only 50 samples are required. The sample probes should be located to avoid known areas of nondegradable solid waste. The permittee shall collect and analyze one sample of landfill gas from each probe to determine the NMOC concentration using Method 25 or 25C of Appendix A of 40 CFR 60. Method 18 of Appendix A of 40 CFR 60 may be used to analyze the samples collected by the Method 25 or 25C sampling procedure. Taking composite samples from different probes into a single cylinder is allowed; however, equal sample volumes must be taken from each probe. For each composite, the sampling rate, collection times, beginning and ending cylinder vacuums, or alternative volume measurements must be recorded to verify that composite volumes are equal. Composite sample volumes should not be less than one liter unless evidence can be provided to substantiate the accuracy of smaller volumes. Terminate compositing before the cylinder approaches ambient pressure where measurement accuracy diminishes. If using Method 18, the permittee must identify all compounds in the sample and, as a minimum, test for those compounds published in the most recent Compilation of Air Pollutant Emission Factors (AP-42), minus carbon monoxide, hydrogen sulfide, and mercury. As a minimum, the instrument must be calibrated for each of the compounds on the list. Convert the concentration of each Method 18 compound to C_{NMOC} as hexane by multiplying by the ratio of its carbon atoms divided by six. If more than the required number of samples are taken, all samples must be used in the analysis. The permittee must divide the NMOC concentration from Method 25 or 25C of Appendix A of 40 CFR 60 by six to convert from C_{NMOC} as carbon

to C_{NMOC} as hexane. If the landfill has an active or passive gas removal system in place, Method 25 or 25C samples may be collected from these systems instead of surface probes provided the removal system can be shown to provide sampling as representative as the two sampling probe per hectare requirement. For active collection systems, samples may be collected from the common header pipe before the gas moving or condensate removal equipment. For these systems, a minimum of three samples must be collected from the header pipe.

- (1) The permittee shall recalculate the NMOC mass emission rate using the equations provided in (a) and using the average NMOC concentration from the collected samples instead of the default value in the equations provided in (a).
- (2) If the resulting mass emission rate calculated using the site-specific NMOC concentration is equal to or greater than 50 megagrams per year, then the permittee shall either comply with paragraph (a)(2) of this condition, or determine the site-specific methane generation rate constant and recalculate the NMOC emission rate using the site-specific methane generation rate using the procedure specified in (d).
- (3) If the resulting NMOC mass emission rate is less than 50 megagrams per year, the permittee shall submit a periodic estimate of the emission rate report as provided in paragraph (b)(1) of reporting and retest the site-specific NMOC concentration every 5 years using the methods specified in monitoring.
- (d) Tier 3. The site-specific methane generation rate constant shall be determined using the procedures provided in Method 2E of appendix A of 40 CFR 60. The permittee shall estimate the NMOC mass emission rate using equations in (a) and using a site-specific methane generation rate constant k, and the site-specific NMOC concentration as determined in (c) instead of the default values provided in (a). The permittee shall compare the resulting NMOC mass emission rate to the standard of 50 megagrams per year.
- (1) If the NMOC mass emission rate as calculated using the site-specific methane generation rate and concentration of NMOC is equal to or greater than 50 megagrams per year, the permittee shall comply with paragraph (a)(2) of this condition.
- (2) If the NMOC mass emission rate is less than 50 megagrams per year, then the permittee shall submit a periodic emission rate report as provided in paragraph (b)(1) of reporting and shall recalculate the NMOC mass emission rate annually, as provided in paragraph (a)(1) of reporting using the equations in (a) and using the site-specific methane generation rate constant and NMOC concentration obtained in (c). The calculation of the methane generation rate constant is performed only once, and the value obtained from this test shall be used in all subsequent annual NMOC emission rate calculations.

Recordkeeping:

(a) Except as provided in paragraph (a)(2)(i)(B) of this condition when subject to (a) of this condition, the permittee shall keep for at least 5 years up-to-date, readily accessible, on-site records of the design capacity report which triggered (a) of this condition, the current amount of solid waste in-place, and the year-by-year waste acceptance rate. Off-site records may be maintained if they

II.B.2.a.2

are retrievable within 4 hours. Either paper copy or electronic formats are acceptable.

(b) Results of monitoring shall also be maintained in accordance with provision I.S.1 of this permit.

Reporting:

II.B.2.a.3

Except as provided in paragraph (a)(2)(i)(B) of this condition,

- (a) An amended design capacity report shall be submitted to the Executive Secretary providing notification of any increase in the design capacity of the landfill, whether the increase results from an increase in the permitted area or depth of the landfill, a change in the operating procedures, or any other means which results in an increase in the maximum design capacity of the landfill. The amended design capacity report shall be submitted within 90 days of the earliest of the following events:
 - (1) the issuance of an amended operating permit;
 - (2) submittal of application for a solid waste permit under R315-310; or
- (3) the change in operating procedures which will result in an increase in design capacity.
- (b) The permittee shall submit an NMOC emission rate report to the Executive Secretary initially and annually thereafter, except as provided for in paragraph (b)(1)(i). The Executive Secretary may request such additional information as may be necessary to verify the reported NMOC emission rate.
- (1) The NMOC emission rate report shall contain an annual or 5-year estimate of the NMOC emission rate calculated using the formula and procedures provided in monitoring.
- (i) If the estimated NMOC emission rate as reported in the annual report to the Executive Secretary is less than 50 megagrams per year in each of the next 5 consecutive years, the permittee may elect to submit an estimate of the NMOC emission rate for the next 5-year period in lieu of the annual report. This estimate shall include the current amount of solid waste-in-place and the estimated waste acceptance rate for each year of the 5 years for which an NMOC emission rate is estimated. All data and calculations upon which this estimate is based shall be provided to the Executive Secretary. This estimate shall be revised at least once every 5 years. If the actual waste acceptance rate exceeds the estimated waste acceptance rate in any year reported in the 5-year estimate, a revised 5-year estimate shall be submitted to the Executive Secretary. The revised estimate shall cover the 5-year period beginning with the year in which the actual waste acceptance rate exceeded the estimated waste acceptance rate exceeded the estimated waste acceptance rate.
- (2) The NMOC emission rate report shall include all the data, calculations, sample reports and measurements used to estimate the annual or 5-year emissions.

- (c) Each permittee subject to the provisions of paragraph (a)(2)(i) of this condition shall submit a collection and control system design plan to the Executive Secretary within 1 year of the first report required under (b) in which the emission rate equals or exceeds 50 megagrams per year, except as follows:
- (1) If the permittee elects to recalculate the NMOC emission rate after Tier 2 NMOC sampling and analysis as provided in (c) of monitoring and the resulting rate is less than 50 megagrams per year, annual periodic reporting shall be resumed, using the Tier 2 determined site-specific NMOC concentration, until the calculated emission rate is equal to or greater than 50 megagrams per year or the landfill is closed. The revised NMOC emission rate report, with the recalculated emission rate based on NMOC sampling and analysis, shall be submitted within 180 days of the first calculated exceedance of 50 megagrams per year.
- (2) If the permittee elects to recalculate the NMOC emission rate after determining a site-specific methane generation rate constant (k), as provided in Tier 3 in (d) of monitoring, and the resulting NMOC emission rate is less than 50 Mg/yr, annual periodic reporting shall be resumed. The resulting site-specific methane generation rate constant (k) shall be used in the emission rate calculation until such time as the emissions rate calculation results in an exceedance. The revised NMOC emission rate report based on the provisions of (d) of monitoring and the resulting site-specific methane generation rate constant (k) shall be submitted to the Executive Secretary within 1 year of the first calculated emission rate exceeding 50 megagrams per year.
- (d) Each permittee of a landfill shall submit a closure report to the Executive Secretary within 30 days of waste acceptance cessation. The Executive Secretary may request additional information as may be necessary to verify that permanent closure has taken place in accordance with the requirements of 40 CFR 258.60. If a closure report has been submitted to the Executive Secretary, no additional wastes may be placed into the landfill without filing a notification of modification as described under 40 CFR 60.7(a)(4).
- (e) The permittee shall notify the Executive Secretary of the awarding of contracts for the construction of the collection and control system or the order to purchase components for the system. This notification shall be submitted within 18 months after reporting an NMOC emission equal to or greater than 50 megagrams per year.
- (f) The permittee shall also comply with the reporting requirements of Section I of this permit.

II.B.2.b Condition:

The permittee shall meet one of the following requirements for all asbestos disposal operations at the landfill:

(a) there shall be no visible emissions to the outside air from any active waste disposal site where asbestos-containing waste material has been deposited,

- at the end of each operating day, or at least once every 24-hour period while the (b) site is in continuous operation, the asbestos-containing waste material that has been deposited at the site during the operating day or previous 24-hour period shall:
- be covered with at least 15 centimeters (6 inches) of compacted nonasbestos-(1)containing material, or
- be covered with a resinous or petroleum-based dust suppression agent that (2) effectively binds dust and controls wind erosion. Such an agent shall be used in the manner and frequency recommended for the particular dust by the dust suppression agent manufacturer to achieve and maintain dust control. Other equally effective dust suppression agents may be used upon prior approval by the Executive Secretary. For purposes of this paragraph, any used, spent, or other waste oil is not considered a dust suppression agent.
- use an alternative emissions control method that has received prior written (c) approval by the U.S. Environmental Protection Agency (USEPA) according to the procedures described in 40 CFR 61.149(c)(2). [Authority granted under 40 CFR 61.154; condition originated in 40 CFR 61.154]

II.B.2.b.1

Monitoring:

If the permittee chooses to comply with the no visible emissions provisions of this condition, a visual opacity observation of each active asbestos disposal site shall be performed on a daily basis in accordance with 58 FR 61640 Method 203C.

If the permittee chooses to comply with the daily cover provisions of this condition, a visual inspection of the site(s) where asbestos containing waste material is deposited shall be conducted daily to verify compliance with this condition.

II.B.2.b.2

Recordkeeping:

If the permittee chooses to comply with the no visible emissions provisions of this condition, a log of the visual opacity observations shall be maintained as described in Provision S.1 in Section I of this permit. All data required by 40 CFR 60, Appendix A, Method 9 or 58 FR 61640, Method 203C shall also be maintained as described in Provision S.1 in Section I of this permit.

If the permittee chooses to comply with the daily cover provisions of this condition, results of daily visual inspections shall be recorded in a log and maintained as described in Provision S.1 in Section I of this permit.

II.B.2.b.3

Reporting:

There are no reporting requirements for this provision except those specified in Section I of this permit.

II.B.2.c

Condition:

Unless a natural barrier adequately deters access by the general public, the permittee shall comply with one of the following:

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- (a) the fencing and warning sign requirements of 40 CFR 61.154 (b), or
- (b) at the end of each operating day, or at least once every 24-hour period while the site is in continuous operation, the asbestos-containing waste material that has been deposited at the site during the operating day or previous 24-hour period shall be covered with at least 15 centimeters (6 inches) of compacted nonasbestos-containing material. [Authority granted under 40 CFR 61.154; condition originated in 40 CFR 61.154]

II.B.2.c.1 Monitoring:

If the permittee chooses to comply with the fencing and warning sign provisions of this condition, a visual inspection of the property line including all entrances to the site and/or sections of the site where asbestos containing waste material is deposited shall be conducted quarterly to verify compliance with the fencing and warning sign requirements of 40 CFR 61.154 (b)

If the permittee chooses to comply with the daily cover provisions of this condition, a visual inspection of the site(s) where asbestos containing waste material is deposited shall be conducted daily to verify compliance with this condition.

II.B.2.c.2 Recordkeeping:

Results of all inspections shall be recorded in a log and maintained as described in Provision S.1 in Section I of this permit.

II.B.2.c.3 Reporting:

There are no reporting requirements for this provision except those specified in Section I of this permit.

II.B.2.d Condition:

The permittee shall maintain waste shipment records of all asbestos-containing waste material received. In addition to routine shipment-tracking information, the waste shipment records shall document instances of improperly enclosed or uncovered waste, or any asbestos-containing waste material not sealed in leak-tight containers. [Authority granted under 40 CFR 61.154 (e); condition originated in 40 CFR 61.154]

II.B.2.d.1 Monitoring:

Records required for this permit condition will serve as monitoring.

II.B.2.d.2 Recordkeeping:

For all asbestos-containing waste material received, the permittee shall maintain waste shipment records, using a form similar to that shown in 40 CFR 61.149, Figure 4, and include the following information:

- (i) The name, address, and telephone number of the waste generator. Waste generator is defined as any owner or operator of a source covered by 40 CFR 61, Subpart M whose act or process produces asbestos-containing waste material.
 - (ii) The name, address, and telephone number of the transporter(s).

- (iii) The quantity of the asbestos-containing waste material in cubic meters (cubic yards).
- (iv) The presence of any improperly enclosed or uncovered waste, or any asbestos-containing waste material not sealed in leak-tight containers.
 - (v) The date of the receipt.

All Records shall be maintained as described in Provisions I.S.1 of this permit (origin: 40 CFR 61.154(e))

II.B.2.d.3

Reporting:

As soon as possible and no longer than 30 days after receipt of the asbestos-containing waste material, the permittee shall send a copy of the signed waste shipment record to the waste generator. The permittee shall report in writing to the Executive Secretary, by the following working day, the presence of a significant amount (either nine (9) or more drums/barrels (35 gallon each) or of seventeen (17) or more plastic bags) of improperly enclosed or uncovered waste and submit a copy of the waste shipment record along with the report.

Upon discovering a discrepancy between the quantity of waste designated on the waste shipment records and the quantity actually received, the permittee shall attempt to reconcile the discrepancy with the waste generator. If the discrepancy is not resolved within 15 days after receiving the waste, the permittee shall immediately submit a written report to the Executive Secretary describing the discrepancy and attempts to reconcile it, and submit a copy of the waste shipment record along with the report. The permittee shall retain a copy of all records and reports required by this condition for at least 5 years. All reports shall be in accordance with Provision I.S.2 of this permit.

II.B.2.e

Condition:

The permittee shall maintain, until closure, records of the location, depth and area, and quantity in cubic meters (cubic yards) of asbestos-containing waste material within the disposal site on a map or diagram of the disposal area. [Authority granted under 40 CFR 61.154 (f); condition originated in 40 CFR 61.154]

II.B.2.e.1

Monitoring:

Records required for this permit condition will serve as monitoring.

II.B.2.e.2

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Recordkeeping:

Maintain, records of the location, depth and area, and quantity in cubic meters (cubic yards) of asbestos-containing waste material within the disposal site on a map or diagram of the disposal area. All Records shall be maintained as described in Provisions I.S.1 of this permit

II.B.2.e.3

Reporting:

Notify the Executive Secretary in writing at least 45 days prior to excavating or otherwise disturbing any asbestos-containing waste material that has been deposited at a waste disposal site and is covered. If the excavation will begin on a date other than the one contained in the original notice, notice of the new start date must be provided to the Executive Secretary at least 10 working days before

excavation begins and in no event shall excavation begin earlier than the date specified in the original notification. Include the following information in the notice:

- (1) Scheduled starting and completion dates.
- (2) Reason for disturbing the waste.
- (3) Procedures to be used to control emissions during the excavation, storage, transport, and ultimate disposal of the excavated asbestos-containing waste material. If deemed necessary, the Executive Secretary may require changes in the emission control procedures to be used.
- (4) Location of any temporary storage site and the final disposal site.

All reports shall be in accordance with Provision I.S.2 of this permit.

II.B.2.f Condition:

Upon closure of an asbestos-containing waste disposal site, the permittee shall submit a copy of records of asbestos waste disposal locations and quantities and shall:

- (a) Comply with one of the following:
 - (1) Either discharge no visible emissions to the outside air from an inactive asbestos-containing waste disposal site or
 - (2) Cover the asbestos-containing waste material with at least 15 centimeters (6 inches) of compacted nonasbestos-containing material, and grow and maintain a cover of vegetation on the area adequate to prevent exposure of the asbestos-containing waste material. In desert areas where vegetation would be difficult to maintain, at least 8 additional centimeters (3 inches) of well-graded, nonasbestos crushed rock may be placed on top of the final cover instead of vegetation and maintained to prevent emissions; or
 - (3) Cover the asbestos-containing waste material with at least 60 centimeters (2 feet) of compacted nonasbestos-containing material, and maintain it to prevent exposure of the asbestos-containing waste; or
 - (4) For inactive waste disposal sites for asbestos tailings, a resinous or petroleum-based dust suppression agent that effectively binds dust to control surface air emissions may be used instead of the methods in paragraphs (a) (1), (2), and (3) of this section. Use the agent in the manner and frequency recommended for the particular asbestos tailings by the manufacturer of the dust suppression agent to achieve and maintain dust control. Obtain prior written approval of USEPA to use other equally effective dust suppression agents. For purposes of this paragraph, any used, spent, or other waste oil is not considered a dust suppression agent.

- (b) Unless a natural barrier adequately deters access by the general public, install and maintain warning signs and fencing as follows, or comply with paragraph (a)(2) or (a)(3) of this condition:
 - (1) Display warning signs at all entrances and at intervals of 100 m (328 ft) or less along the property line of the site or along the perimeter of the sections of the site where asbestos-containing waste material was deposited. The warning signs must:
 - (i) Be posted in such a manner and location that a person can easily read the legend; and
 - (ii) Conform to the requirements for 51 cm×36 cm (20"×14") upright format signs specified in 29 CFR 1910.145(d)(4) and this paragraph; and
 - (iii) Display the following legend in the lower panel with letter sizes and styles of a visibility at least equal to those specified in this paragraph.

Legend	Notation
Asbestos Waste Disposal Site	2.5 cm (1 inch) Sans Serif, Gothic or Block
Do Not Create Dust	1.9 cm (3/4 inch) Sans Serif, Gothic or Block
Breathing Asbestos is Hazardous to Your Health	14 Point Gothic

Spacing between any two lines must be at least equal to the height of the upper of the two lines.

- (2) Fence the perimeter of the site in a manner adequate to deter access by the general public.
- (3) When requesting a determination on whether a natural barrier adequately deters public access, supply information enabling the Administrator to determine whether a fence or a natural barrier adequately deters access by the general public.

(c) In lieu of complying with the requirements of paragraph (a) or (b) of this condition, the permittee may use an alternative control method that has received prior approval of the USEPA. [Authority granted under 40 CFR 61.154 (g); condition originated in 40 CFR 61.151]

II.B.2.f.1 **Monitoring:**

A visual inspection of each closed site where asbestos-containing waste material is deposited shall be conducted quarterly to verify compliance with all the requirements of 40 CFR 61.151

II.B.2.f.2 Recordkeeping:

Results of all inspections shall be recorded in a log and maintained as described in Provision S.1 in Section I of this permit

II.B.2.f.3 Reporting:

- (a) Notify the Executive Secretary in writing at least 45 days prior to excavating or otherwise disturbing any asbestos-containing waste material that has been deposited at a waste disposal site and is covered. If the excavation will begin on a date other than the one contained in the original notice, notice of the new start date must be provided to the Executive Secretary at least 10 working days before excavation begins and in no event shall excavation begin earlier than the date specified in the original notification. Include the following information in the notice:
 - (1) Scheduled starting and completion dates.
 - (2) Reason for disturbing the waste.
 - (3) Procedures to be used to control emissions during the excavation, storage, transport, and ultimate disposal of the excavated asbestos-containing waste material. If deemed necessary, the Executive Secretary may require changes in the emission control procedures to be used.
 - (4) Location of any temporary storage site and the final disposal site.
- (b) Within 60 days of a site becoming inactive and after the effective date of this subpart, record, in accordance with State law, a notation on the deed to the facility property and on any other instrument that would normally be examined during a title search; this notation will in perpetuity notify any potential purchaser of the property that:
 - (1) The land has been used for the disposal of asbestos-containing waste material;

- (2) The survey plot and record of the location and quantity of asbestos-containing waste disposed of within the disposal site required in 40 CFR 61.154(f) have been filed with the USEPA; and
- (3) The site is subject to 40 CFR 61, Subpart M.

II.B.3 Conditions on Cold Cleaning Unit (Parts Washer)

II.B.3.a Condition:

The permittee shall ensure that the following conditions are met:

- (1) Each solvent degreaser is equipped with a cover which shall remain closed except during actual loading, unloading or handling of parts in cleaner. The cover shall be designed so that it can be easily operated with one hand if
- (a) the volatility of the solvent is greater than 2 kPa (15 mm Hg or 0.3 psi) measured at 38 degrees C (100 degrees F),
 - (b) the solvent is agitated, or
 - (c) the solvent is heated.
- (2) An internal draining rack for cleaned parts shall be installed on which parts shall be drained until all dripping ceases. If the volatility of the solvent is greater than 4.3 kPa (32 mm Hg at 38 degrees C (100 degrees F)), the drainage facility must be internal, so that parts are enclosed under the cover while draining. The drainage facility may be external for applications where an internal type cannot fit into the cleaning system.
- (3) Waste or used solvent shall be stored in covered containers. Waste solvents or waste materials which contain solvents shall be disposed of by recycling, reclaiming, by incineration in an incinerator approved to process hazardous materials, or by an alternate means approved by the executive secretary.
- (4) Tanks, containers and all associated equipment shall be maintained in good operating condition and leaks shall be repaired immediately or the degreaser shall be shutdown.
- (5) Written procedures for the operation and maintenance of the degreasing or solvent cleaning equipment shall be permanently posted in an accessible and conspicuous location near the equipment.
- (6) If the solvent volatility is greater than 4.3 kPa (33 mm Hg or 0.6 psi) measured at 38 degrees C (100 degrees F), or if solvent is heated above 50 degrees C (120 degrees F), then one of the following control devices shall be used:
 - (a) freeboard that gives a freeboard ratio greater than 0.7;
 - (b) water cover if the solvent is insoluble in and heavier than water;
- (c) other systems of equivalent control, such as a refrigerated chiller or carbon absorption.
- (7) If used, the solvent spray shall be a solid fluid stream at a pressure which does not cause excessive splashing and may not be a fine, atomized or shower type spray. [Authority granted under R307-335-2; condition originated in R307-335-2]

II.B.3.a.1 Monitoring:

A visual observation shall be conducted monthly for all equipment and applicable work practices.

II.B.3.a.2 Recordkeeping:

Results of monthly inspections and the volatility of the solvent(s) being used shall be recorded and maintained as described in Provision I.S.1 of this permit.

II.B.3.a.3 Reporting:

There are no reporting requirements for this provision except those specified in Section I of this permit.

II.C. Emissions Trading.

(R307-415-6a(10))

Not applicable to this source.

II.D. Alternative Operating Scenarios.

(R307-415-6a(9))

Not applicable to this source.

Section III: PERMIT SHIELD

A permit shield was not granted for any specific requirements.

Section IV: ACID RAIN PROVISIONS.

This source is not subject to Title IV. This section is not applicable.

REVIEWER COMMENTS

- 1. Comment on an item originating in 40 CFR 60.154 regarding MSW Landfill (Unit Landfill)

 Definition of Significant Amount for asbestos shipments received: A significant amount of waste is hereby defined as one cubic meter of asbestos-containing waste material. Based on EPA standard conversion factors for typical asbestos-waste containers, one cubic meter of material is approximately equal to 9.8 drums or barrels (35 gallon each) or 17.4 plastic bags. [Comment last updated on 5/03/2002]
- 2. Comment on an item originating in R307-307 regarding permitted source (Source-wide)
 Salting and Sanding Requirements: R307-307 requires that any person who applies
 salt, crushed slag or sand to roads in Salt Lake, Davis, or Utah Countys shall maintain
 records of material applied as outlined in the permit. It also requires the salt to be at
 least 92% sodium chloride (NaCl) unless they vacuum sweep every arterial roadway
 within three days of the end of the storm. Since the landfill does not salt or sand any
 roadways that meet the definition of arterial as shown on the local Urbanized Area map
 specified in the rule, they are not subject to the 92% limit and are only required to keep
 the records required by the rule. [Comment last updated on 5/21/2002]

Important Note: The following checklist is for the permit application and addresses only the requirements of the Division of Solid and Hazardous Waste. Other **federal**, state, or local agencies may have requirements that the facility must meet. The applicant is responsible to be informed of, and meet, any applicable requirements. Examples of these requirements may **include** obtaining a conditional use permit, a business license, or a storm water permit. The applicant is **reminded** that obtaining a permit under the *Solid Waste Permitting and Management Rules* does not **exempt** the facility from these other requirements.

An application for a permit to construct and operate a landfill is the **documentation** that the landfill will be located, designed, constructed, and operated to meet the requirements of Rules R315-302, R315-303, R315-308, R315-309, and R315-315 of the *Utah Solid Waste Permitting and Management Rules* and the *Utah Solid and Hazardous Waste Act* (UCA 19-6-101 through 123). The application should be written to be understandable by regulatory agencies, landfill operators, and the general public. The application should also be written so that the landfill operator, after reading it, will be able to operate the landfill according to the requirements with a minimum of additional training.

Copies of the Solid Waste Permitting and Management Rules, the Utah Solid and Hazardous Waste Act, along with many other useful guidance documents can be obtained by contacting the Division of Solid and Hazardous Waste at 801-538-6170. Most of these documents are available on the Division's web page at www.hazardouswaste.utah.gov. Guidance documents can be found at the solid waste section portion of the web page.

When the application is determined to be complete, the original complete application and one copy of the complete application are required along with an electronic copy.

Part II Application Checklist

I. Facility General Information	
Description of Item	
Completed Part I General information	Part I – General Info.
General description of the facility (R315-310-3(1)(b))	Part II - Sect. 1.0
Legal description of property (R315-310-3(1)(c))	Part II – Sect 2 Appendix B
Proof of ownership, lease agreement, or other mechanism (R315-310-3(1))	(c)) Appendix B
Area served by the facility including population (R315-310-3(1)(d))	Part II - Sect. 1.1
If the permit application is for a class I landfill a demonstration that the land not a commercial facility	fill is Part II – Sect. 1.0
Waste type and anticipated daily volume (R315-310-3(1)(d))	Part II – Sect. 1.2
Intended schedule of construction (R315-302-2(2)(a))	Part II - Sect. 3.1
Demonstration That The Facility Meets The Location Standard (R315-302-1)	8
Land use compatibility	Appendix F
Maps showing the existing land use, topography, residences, parks monuments, recreation areas or wilderness areas within 1000 feet site boundary	
Certifications that no ecologically or scientifically significant areas or endangered species are present in site area	Part III – Sect. 2.1.1.1
List of airports within five miles of facility and distance to each	Part III - Sect. 2.1.1.1

I. Facility General Information Description of Item	Location In Document
Geology	
Geologic maps showing significant geologic features, faults, and unstable areas	Appendix G
Maps showing site soils	Appendix G
Surface water	
Magnitude of 24 hour 25 year and 100 year storm events	Part III – Sect. 1.8.2 Appendix N
Average annual rainfall	Part III - Sect. 1.8
Maximum elevation of flood waters proximate to the facility	Appendix N
Maximum elevation of flood water from 100 year flood for waters proximate to the facility	Appendix N
Wetlands	Part III - Sect. 2.1.4
Ground water	Part III - Sect. 2.1.5
Plan of Operations (R315-310-3(1)(e) and R315-302-2(2))	
Forms and other information as required in R3315-302-2(3) including a description of on-site waste handling procedures and an example of the form that will be used to record the weights or volumes of waste received (R315-302-2(2)(b) And R315-310-3(1)(f))	Part II – Sect. 3.2 Appendix E
Schedule for conducting inspections and monitoring, and examples of the forms that will be used to record the results of the inspections and monitoring (R315-302-2(2)(c), R315-302-2(5)(a), and R315-310-3(1)(g))	Part II – Sect. 3.13 Part II – Sect. 3.15 Appendix E
Contingency plans in the event of a fire or explosion (R315-302-2(2)(d))	Part II – Sect. 3.6.1 Part II – Sect 3.6.2
Corrective action programs to be initiated if ground water is contaminated (R315-302-2(2)(e))	Appendix C
Contingency plans for other releases, e.g. explosive gases or failure of run-off collection system (R315-302-2(2)(f))	Part II - Sect. 3.6.3 Part II - Sect. 3.6.4
Plan to control fugitive dust generated from roads, construction, general operations, and covering the waste (R315-302-2(2)(g))	Part II - Sect. 3.9
Plan for litter control and collection (R315-302-2(2)(h))	Part II - Sect. 3.9.2
Description & maintenance of installed equipment (R315-302-2(2)(i))	Part II - Sect. 3.8
Procedures for excluding the receipt of prohibited hazardous or PCB containing wastes (R315-302-2(2)(j))	Part II – Sect. 3.10 Part II – Sect. 3.12
Procedures for controlling disease vectors (R315-302-2(2)(k))	Part II - Sect. 3.9.3
A plan for alternative waste handling (R315-302-2(2)(I))	Part II - Sect. 3.7
A general training and safety plan for site operations (R315-302-2(2)(o))	Part II - Sect. 3.12
Any recycling programs planned at the facility (R315-303-4(6))	Part II - Sect. 3.11
Closure and post-closure care Plan (R315-302-2(2)(m))	Part II – Sect. 4 Part II – Sect. 5

I. Facility General Information	
Description of Item	Location In Document
Procedures for the handling of special wastes (R315-315)	Part II – Sect. 3.2.4
Plans and operation procedures to minimize liquids (R315-303-3(1)(a) and (b))	Part III - Sect. 3.3
Plans and procedures to address the requirements of R315-303-3(7)(c) through (i) and R315-303-4	Part II
Any other site specific information pertaining to the plan of operation required by the Executive Secretary (R315-302-2(2)(p))	Part II – Sect. 3
SPECIAL REQUIREMENTS FOR A CLASS V LANDFILL (R315-310-3(2))	
Submit information required by the <i>Utah Solid and Hazardous Waste Act</i> Subsections 19-6-108(9) and 19-6-108(10) (R315-310-3(2)(a))	Not Applicable
Approval from the local government within which the solid waste facility sits	Not Applicable

// Facility Technical Information	our contain supplication of	
Description of Item		Location In Document
Maps	The first section of the section of	
Topographic map drawn to the required scale with contours show boundaries of the landfill unit, ground water monitoring well location monitoring points, and the borrow and fill areas (R315-310-4(2)(a)	ons, gas	Appendix A Appendix G Appendix I
Most recent U.S. Geological Survey topographic map, 7-1/2 minu showing the waste facility boundary; the property boundary; surfa channels; any existing utilities and structures within one-fourth mi and the direction of the prevailing winds (R315-310-4(2)(a)(ii))	ce drainage	Appendix A – Dwg. 1
Geohydrological Assessment (R315-310-4(2)(b))	special page construction	
Local and regional geology and hydrology including faults, unstab subsidence areas on site (R315-310-4(2)(b)(i))	ole slopes and	Part III - Sect. 1.1
Evaluation of bedrock and soil types and properties including peri (R315-310-4(2)(b)(ii))	meability rates	Part III - Sect. 1.2
Depth to ground water (R315-310-4(2)(b)(iii))		Part III - Sect. 1.3.2
Direction and flow rate of ground water (R315-310-4(2)(b)(iv))		Part III - Sect. 1.3.3
Quantity, location, and construction of any private or public wells 2,000 feet of the facility boundary (R315-310-4(2)(b)(v))	on-site or within	Part III – Sect. 1.5 Appendix J
Tabulation of all water rights for ground water and surface water (2,000 feet of the facility boundary (R315-310-4(2)(b)(vi))	on-site and within	Part III – Sect. 1.5 Appendix J
Identification and description of all surface waters on-site and with the facility boundary (R315-310-4(2)(b)(vii))	hin one mile of	Part III – Sect. 1.6
Background ground water and surface water quality assessment existing facility, identification of impacts upon the ground water ar from leachate discharges (R315-310-4(2)(b)(viii))	and, for an nd surface water	Part III – Sect. 1.7

// Facility Technical Information	
Description of Item	Location In Document
Ground Water Monitoring (R315-303-3(7)(b) and R315-308)	Appendix C
Statistical method to be used (R315-308-2(7))	Appendix C
Calculation of site water balance (R315-310-4(2)(b)(ix))	Part II Sect. 1.8
ENGINEERING REPORT - PLANS, SPECIFICATIONS, AND CALCULATIONS	
Documentation that the facility will meet all of the performance standards of R315-303-2	Appendix C&D Part II Sect. 3.4.4 &Sect. 5.1.4
Engineering reports required to meet the location standards of R315-302-1 including documentation of any demonstration or exemption made for any location standard (R315-310-4(2)(c)(i))	Part III Sect. 2.1
Anticipated facility life and the basis for calculating the facility's life (R315-310-4(2)(c)(ii))	Appendix A – Dwg. 8
Cell design to include liner design, cover design, fill methods, elevation of final cover including plans and drawings signed and sealed by a professional engineer registered in the State of Utah (R315-303-3(3), R315-303-3(6) and (7)(a), R315-310-3(1)(b) and R315-310-4(2)(c)(iii))	Part III Sect. 2.3
Leachate collection system design and calculations showing system meets the requirements of R315-303-3(2)	Part III – Sect. 1.8
Equipment requirements and availability (R315-310-4(2)(c)(iii))	Part II - Sect. 1.4
Identification of borrow sources for daily and final cover and for soil liners (R315-310-4(2)(c)(iv))	Part III – Sect. 2.3.5
Run-On and run-off diversion designs (R315-303-3(1)(c), (d) and (e))	Part III - Sect. 2.5
Leachate collection, treatment, and disposal and documentation to show that any treatment system is being or has been reviewed by the Division of Water Quality (R315-310-4(2)(c)(v) and R315-310-3(1)(i))	Part III - Sect. 2.4.2 Appendix D
Ground water monitoring plan that meets the requirements of Rule R315-308 including well locations, design, and construction (R315-310-4(2)(b)(x) and R315-310-4(2)(c)(vi))	Part III – Sect. 2.4.1 Appendix C
Landfill gas monitoring and control plan that meets the requirements of Subsection R315-303-3(5) (R315-310-4(2)(c)(vii))	Part III - Sect. 2.4.3
Slope stability analysis for static and under the anticipated seismic event for the facility (R315-310-4(2)(b)(i) and R315-302-1(2)(b)(ii))	Part III – Sect 2.1.2.3, 2.1.2.4, & 2.1.2.5
Design and location of run-on and run-off control systems (R315-310-4(2)(c)(viii))	Part III - Sect. 1.8.3
CLOSURE PLAN (R315-310-3(1)(h))	
Closure Plan (R315-302-3(2) and (3))	Part II – Section 4
Post-Closure Plan (R315-302-3(5) and (6))	Part II – Section 5
Closure schedule (R315-310-4(2)(d)(i))	Part III - Sect. 2.6
Design of final cover (R315-303-3(4) and R315-310-4(2)(c)(iii))	Part III - Sect. 2.3.5.3
Capacity of site in volume and tonnage (R315-310-4(2)(d)(ii))	Part III – Sect. 2.2 App. A – Dwg. 8
Final inspection by regulatory agencies (R315-310-4(2)(d)(iii))	Part II – Section 4.4

// Facility Technical Information	
Description of Item	Location In Document
POST-CLOSURE CARE PLAN (R315-310-3(1)(h))	
Site monitoring of landfill gases, ground water, and surface water, if required (R315-310-4(2)(e)(i))	Part II – Sect. 5.1
Changes to record of title, land use, and zoning restrictions (R315-310-4(2)(e)(ii))	Part II - Sect. 4.4
Maintenance activities to maintain cover and run-on/run-off control systems (R315-310-4(2)(e)(iii))	Part II – Sect. 5.2
List the name, address, and telephone number of the person or office to contact about the facility during the post-closure care period (R315-310-4(2)(e)(vi))	Part II – Sect. 5.6
FINANCIAL ASSURANCE (R315-310-3(1)(j))	
Identification of closure costs including cost calculations (R315-310-4(2)(d)(iv)) and (R315-302-2(2)(n))	Part III – Sect. 2.9.1
Identification of post-closure care costs including cost calculations (R315-310-4(2)(e)(iv))	Part III – Sect. 2.9.2
Identification of the financial assurance mechanism that meets the requirements of Rule R315-309 and the date that the mechanism will become effective (R315-309-1(1))	Part III – Sect. 2.9.3

N: All Sws-form Permit Application forms Class I and V application and checklist doc